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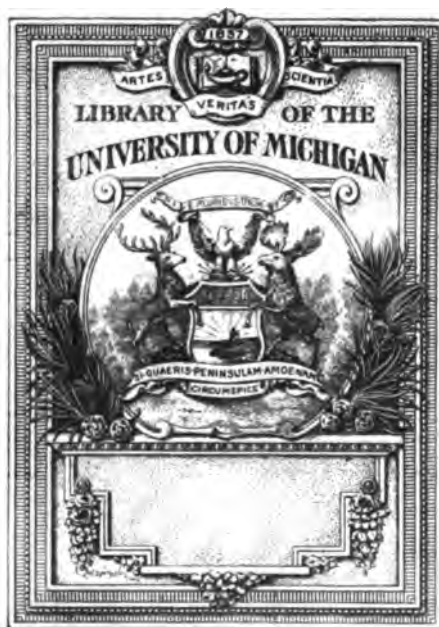
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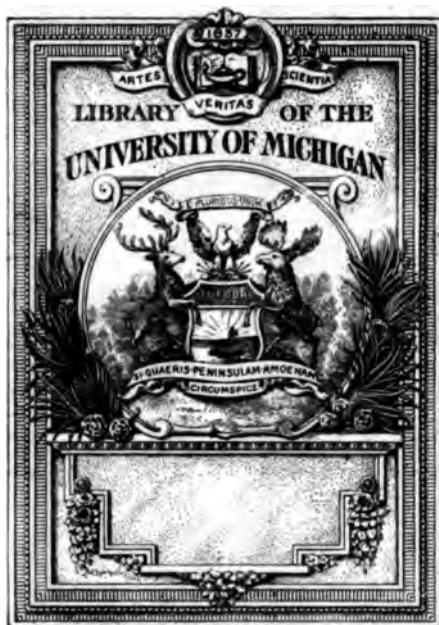




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*U. S. Nautical Almanac Office*  
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THE  
AMERICAN EPHEMERIS  
AND  
NAUTICAL ALMANAC

FOR THE YEAR

1917

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# U. S. NAVAL OBSERVATORY.

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NOTE.—Those whose names are printed in *italics* devote only a small portion of their time to work of the Nautical Almanac Office.

October, 1914.

## PREFACE.

---

This volume of the *American Ephemeris and Nautical Almanac* was prepared under the immediate supervision of Professor W. S. EICHELBERGER, U. S. N., the Director. The character of the matter herein contained and its arrangement are the same as in the preceding volume.

This is the second volume to be issued under the international agreement resulting from the *Congrès International des Éphémérides Astronomiques* held at Paris in October, 1911.

The naval appropriation bill approved August 22, 1912, contained the following:

The Secretary of the Navy is hereby authorized to arrange for the exchange of data with such foreign almanac offices as he may from time to time deem desirable, with a view to reducing the amount of duplication of work in preparing the different national nautical and astronomical almanacs and increasing the total data which may be of use to navigators and astronomers available for publication in the *American Ephemeris and Nautical Almanac*: *Provided*, That any such arrangement shall be terminable on one year's notice: *Provided further*, That the work of the Nautical Almanac Office during the continuance of any such arrangement shall be conducted so that in case of emergency the entire portion of the work intended for the use of navigators may be computed by the force employed by that office, and without any foreign cooperation whatsoever: *Provided further*, That any employee of the Nautical Almanac Office who may be authorized in any annual appropriation bill and whose services in whole or in part can be spared from the duty of preparing for publication the annual volumes of the *American Ephemeris and Nautical Almanac* may be employed by said office in the duty of improving the tables of the planets, moon, and stars, to be used in preparing for publication the annual volumes of the office: *Provided further*, That section four hundred and thirty-five, Revised Statutes, is hereby repealed.

The volume, as in previous years, is divided into three parts, as follows:

Part I, *Ephemeris for the Meridian of Greenwich*, which gives the ephemerides of the Sun and Moon, the geocentric and heliocentric positions of the major planets, and other fundamental astronomical data for equidistant intervals of Greenwich mean time.



Part II, *Ephemeris for the Meridian of Washington*, which gives ephemerides of 825 stars, Sun, Moon, and major planets, for transit over the meridian of the Naval Observatory, Washington, which passes midway between the West and East Transit Circles of the Observatory. The mean places of the fixed stars and the data for their reduction are also included in Part II.

Part III, *Phenomena*, which contains predictions of phenomena to be observed, with data for their computation. Greenwich mean time is used throughout this part except with the occultations visible at Washington where Washington time is used. Tables for the determination of latitude and azimuth from Polaris, tables for the conversion of time, and an alphabetical list of observatories, with their latitudes, longitudes, and other data, are contained in this part.

The Greenwich ephemerides of the Sun, Moon, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune were furnished by the office of the British *Nautical Almanac*.

The Greenwich ephemeris of Mercury, the elements of Saturn's rings, the elongations of Saturn's satellites, and the apparent places for Greenwich transit of 518 ten-day stars were furnished by the office of the *Berliner Jahrbuch*.

The conjunctions, phenomena, and configurations of Jupiter's satellites I-IV and the apparent places for Greenwich transit of 38 circumpolar stars were furnished by the office of the *Connaissance des Temps*.

The apparent places for Greenwich transit of 121 ten-day stars were furnished by the office of the *Almanaque Nautico*.

The apparent places for Greenwich transit of 137 ten-day stars were furnished by the office of the *Annuario Astronomico di Torino*.

In accordance with the recommendations of the *Congrès International des Éphémérides Astronomiques*, most of the material furnished from abroad is based upon tables prepared in the American Nautical Almanac Office. In the Introduction are mentioned the various tables upon which the different ephemerides are based.

The following computations were made by the American Nautical Almanac Office:

In Part I, all the hourly and daily variations for the quantities furnished from abroad except in the case of the right ascension and declination of the Moon.

In Part II, the quantities used in computing the apparent places of the stars from their mean places; the mean place list; the interpolation of the apparent places of 814 stars from transit at Greenwich

to transit at Washington; the apparent places of 11 stars; the interpolation of the ephemerides of the Sun, Moon, and planets from Greenwich noon to transit at Washington; the stellar magnitudes of the planets.

In Part III, the data relating to the eclipses of the Sun and Moon; the data relating to the occultations of stars by the Moon; the ephemerides for physical observations of the Sun, Moon, Mars, and Jupiter; the elements of the illuminated disks of Mercury and Venus; the stellar magnitudes of the planets; the data concerning the satellites of Uranus, Neptune, the fifth, sixth, and seventh satellites of Jupiter, and the ninth satellite of Saturn; the diagrams of all the satellite orbits; the position angle and distance tables of the satellites of Saturn; the list of phenomena; the list of observatories with their geographical coordinates; and the tables for the determination of latitude and azimuth from observations of Polaris.

All computations made in the American Nautical Almanac Office and those received from the other offices were subjected to checks to insure absence of errors.

J. A. HOOGEWERFF,

*Captain, U. S. Navy,*

*Superintendent Naval Observatory.*

U. S. NAVAL OBSERVATORY, *October, 1914.*



# CONTENTS.

	Page.
Errata . . . . .	viii
Introduction . . . . .	ix
Anniversaries and Festivals . . . . .	xvi
Chronological Eras and Cycles . . . . .	xvii
Astronomical Constants . . . . .	xviii
Symbols and Abbreviations . . . . .	xx

## PART I—EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

Ephemeris of the Sun . . . . .	2
Ephemeris of the Moon . . . . .	26
Phases of the Moon . . . . .	117
Ephemerides of the Planets Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune . . . . .	134

## PART II—EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

Bessel's Formulæ for Star-Reductions . . . . .	200
Besselian and Independent Star-Numbers . . . . .	202
Nutation, Terms of Short Period in the . . . . .	215
Mean Places of 790 Standard Stars for 1917.0 . . . . .	217
Mean Places of 35 Circumpolar Stars for 1917.0 . . . . .	231
Apparent Places of 35 Circumpolar Stars . . . . .	232
Apparent Places of 790 Standard Stars . . . . .	316
Ephemeris of the Sun for Apparent Noon . . . . .	514
Moon-Culminations . . . . .	522
Transit-Ephemerides of the Planets Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune . . . . .	538

## PART III—PHENOMENA.

Eclipses . . . . .	556
Mean Places of Stars Occulted by the Moon . . . . .	564
Elements for the Prediction of Occultations . . . . .	569
Occultations Visible at Washington . . . . .	611
Ephemeris for Physical Observations of the Sun . . . . .	614
Moon, Mean Equator, Orbit, and Mean Longitude . . . . .	615
Ephemeris for Physical Observations of the Moon . . . . .	616
Disks of Mercury and Venus . . . . .	624
Ephemeris for Physical Observations of Mars . . . . .	626
Ephemeris for Physical Observations of Jupiter . . . . .	628
Satellites of Jupiter, Saturn, Uranus, and Neptune . . . . .	632
Phenomena, Planetary Configurations . . . . .	672
Positions of Observatories . . . . .	674
Problems in Lunar Distances . . . . .	684

## TABLES.

Table I—For Finding the Latitude by an Observed Altitude of Polaris . . . . .	685
Table Ia—Auxiliary Table of Corrections for Latitudes other than 45° . . . . .	689
Table II—Sidereal into Mean Solar Time . . . . .	690
Table III—Mean Solar into Sidereal Time . . . . .	693
Table IV—Azimuth of Polaris at all Hour Angles . . . . .	696
Table IVa—Correction for Declination . . . . .	701
Table V—Azimuth of Polaris at Elongation . . . . .	702
Table Va—For Reduction of Observations Near Elongation . . . . .	707
Table VI—For Finding the Times of Upper and Lower Culmination of Polaris . . . . .	708
Table VII—Apparent Place, Upper Culmination, and Elongations, of Polaris . . . . .	709

On the Arrangement and Use of <i>The American Ephemeris and Nautical Almanac</i> . . . . .	711
Index to Apparent Places of Stars . . . . .	738
General Index . . . . .	741

# ERRATA.

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## *The American Ephemeris, 1916.*

Page.

141	Dec. 32, Var. per Hour of Right Ascension . . .	for	+11°.878	read	+11°.874
743	Moon, Longitude, Mean, Page . . .	for	118	read	611
743	Moon, Longitude, True, Page . . .	for	611	read	118
744	Parallax, Horizontal, of Jupiter, Page . . .	for	134, 538	read	174, 548

# INTRODUCTION.

---

The ephemeris of the Sun is constructed from NEWCOMB'S *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1.

The adopted value of the mean equatorial horizontal parallax of the Sun is  $8''.80$ , *Paris Conference, May, 1896*.

The Sun's rectangular equatorial coordinates are computed from the longitudes and latitudes by the following formulæ:

$$\begin{aligned} X &= R \cos \lambda \\ Y &= R \sin \lambda \cos \omega - 19.3 R \beta \\ Z &= R \sin \lambda \sin \omega + 44.5 R \beta \end{aligned}$$

The reductions to mean equinox are computed by the formulæ—

$$\begin{aligned} \Delta X &= + Y \sec \omega \Delta \lambda \sin 1'' \\ \Delta Y &= -X \cos \omega \Delta \lambda \sin 1'' + Z \Delta \omega \sin 1'' + 9.1 \tau R \sin (\lambda + 6^\circ) \\ \Delta Z &= -X \sin \omega \Delta \lambda \sin 1'' - Y \Delta \omega \sin 1'' - 21.0 \tau R \sin (\lambda + 6^\circ) \end{aligned}$$

where the numerical coefficients are in units of the seventh place of decimals and

$R$  = the Sun's distance from the Earth,

$\lambda$  = the Sun's true longitude,

$\beta$  = the Sun's true latitude, expressed in seconds of arc,

$\omega$  = the obliquity of the ecliptic,

$\Delta \lambda$  = the reduction of longitude for precession and nutation from the beginning of the Besselian fictitious year,

$\Delta \omega$  = the reduction of the mean to the apparent obliquity,

$\tau$  = the fraction of the year since the beginning of the Besselian fictitious year.

The longitude, latitude, and parallax of the Moon are derived from HANSEN'S *Tables de la Lune* (London, 1857), the mean longitude being corrected as in previous years, beginning with the volume for the year 1883. The statement concerning these corrections which is contained in the volumes from 1883 to 1911, inclusive, is erroneous, in that they have not been computed strictly in accordance with the formula in NEWCOMB'S *Researches on the Motion of the Moon*, part 1, page 268, *Washington Observations*, 1875, Appendix II. That formula is,

$$-1''.14 - 29''.17 T - 3''.86 T^2 - V_2 - 0''.09 \sin A - 15''.49 \cos A,$$

while the expression actually used is,

$$-1''.14 - 29''.17 T - 3''.76 T^2 - V_2 - 15''.49 \cos A.$$

In these formulæ  $T$  is the time in units of 100 years reckoned from 1800.

The ephemerides of Mercury, Venus, and Mars are derived from NEWCOMB'S tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VI, parts 2, 3, and 4.

The ephemerides of Jupiter and Saturn are derived from the tables constructed in this office by GEORGE W. HILL, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 1 and 2.

The ephemerides of Uranus and Neptune are derived from NEWCOMB'S tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 3 and 4.

The nutation used in computing the ephemerides of the Sun, Moon, and planets has been taken from Tables XXXII and XXXIII of NEWCOMB'S *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1. The formulæ from which this nutation is computed are as follows, the time interval T being expressed in units of 100 years, reckoned from 1900. See *Tables of the Sun*, page 26.

$$\begin{array}{ll} \delta\psi = -(17''.234 + 0''.017 T) \sin \Omega & \delta\epsilon = +9''.214 \cos \Omega \\ + 0''.209 \sin 2 \Omega & -0''.090 \cos 2 \Omega \\ - 1''.257 \sin 2 L & +0''.546 \cos 2 L \\ - 0''.049 \sin (3 L + 78^\circ.7) & +0''.021 \cos (3 L + 78^\circ.7) \\ + 0''.110 \sin (L + 75^\circ.3) & -0''.009 \cos (L - 78^\circ.7) \end{array}$$

The formulæ for the nutation used in computing the Besselian and Independent Star Numbers are as follows:

Terms of Long Period.	Terms of Short Period.
$\delta\psi = -(17''.234 + 0''.017 T) \sin \Omega$	$-0''.204 \sin 2 \mathcal{C}$
$+ 0''.209 \sin 2 \Omega$	$+0''.011 \sin (\mathcal{C} + \Gamma')$
$- 1''.272 \sin 2 L$	$+0''.068 \sin (\mathcal{C} - \Gamma')$
$+ 0''.126 \sin (L - \Gamma)$	$-0''.034 \sin (2 \mathcal{C} - \Omega)$
$- 0''.050 \sin (3 L - \Gamma)$	$-0''.026 \sin (3 \mathcal{C} - \Gamma')$
$+ 0''.021 \sin (L + \Gamma)$	$+0''.015 \sin (\mathcal{C} - 2 L + \Gamma')$
$+ 0''.012 \sin (2 L - \Omega)$	$+0''.006 \sin 2 (\mathcal{C} - L)$
$\delta\epsilon = + (9''.210 + 0''.0009 T) \cos \Omega$	$+0''.088 \cos 2 \mathcal{C}$
$- 0''.090 \cos 2 \Omega$	$+0''.018 \cos (2 \mathcal{C} - \Omega)$
$+ 0''.551 \cos 2 L$	$+0''.011 \cos (3 \mathcal{C} - \Gamma')$
$+ 0''.022 \cos (3 L - \Gamma)$	$-0''.005 \cos (\mathcal{C} + \Gamma')$
$- 0''.009 \cos (L + \Gamma)$	
$- 0''.007 \cos (2 L - \Omega)$	

The meaning of the symbols used and the manner in which these latter formulæ have been employed in computing the ephemerides of the stars are explained on pages 200 and 201. The slight discrepancy between the terms in 2 L in these two sets of formulæ is due to the correction of an error in the first set. See *Bulletin Astronomique*, 1898, Vol. XV, page 244.

The list of 825 stars contained in Part II has been selected from NEWCOMB'S *Catalogue of Fundamental Stars, Astronomical Papers of the American Ephemeris*, Vol. VIII, part 2.

In general, the names of the stars are the same as in NEWCOMB'S Suggested List of Fundamental Stars, except that the FLAMSTEED number has been omitted in all cases where Greek or italic letters are available. In some cases the constellation and number of the uranometries of HEIS or GOULD have been used. In all such cases, H<sup>1</sup> or the letter G precedes the constellation name, as, for example, 5 H<sup>1</sup>. Cassiopeiæ and 38 G. Horologii.

The magnitudes of the stars have, with a few exceptions, been taken from *Annals of the Harvard College Observatory*, Vol. L, 1908.

The spectral classification has been furnished by the Harvard College Observatory. The notation is that of *Annals of Harvard College Observatory*, Vol. LVI.

The mean places, annual variations, and annual proper motions of the stars have been taken from NEWCOMB's Catalogue, except that those of  $\epsilon$  Hydri, 38 G. Horologii, and  $\pi$  Centauri have been taken from *Veröffentlichungen des Königlichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33.

The values of  $\Delta\alpha$  and  $\Delta\delta$  which are given for the companions to the stars  $\gamma$  Andromedæ,  $\alpha^1$  Crucis,  $\zeta^1$  Ursæ Majoris and 61 Cygni, have been taken from BOSS's *Preliminary General Catalogue*, and those for  $\alpha^2$  Geminorum from DOBERCK's elements given in the *Astronomische Nachrichten*, 1904, vol. 166, page 145.

The formulæ for the computation of the Besselian and Independent Star Numbers are given on page 200, the coefficients being those given by NEWCOMB in *Bulletin Astronomique*, 1898, Vol. XV, page 241.

The terms of short period of the nutation, depending on the Moon's mean longitude, have been computed from the formulæ for these terms given above.

The method by which the right ascensions and declinations of the stars interpolated from the 10-day ephemerides are corrected for the effect of these short-period terms is given on page 201.

According to the formulæ on pages 200 and 201 the star constants  $a, b, c, d, a', b', c', d'$  are computed for each star from its mean place at the beginning of the year, but if strict accuracy is required they should be computed from the star's mean place at date, and the following second-order terms should be added to the usual expressions for the reduction from mean to apparent place, namely—

To $\alpha - \alpha_0$	To $\delta - \delta_0$
$\left. \begin{aligned} &+0.000\ 003\ \tau^2 \sin \alpha \\ &-0.000\ 149\ \tau^2 \cos \alpha \end{aligned} \right\} \tan \delta$ $\left. \begin{aligned} &-0.000\ 0650\ \tau^2 \sin 2\alpha \\ &+0.000\ 0103\ \sin 2\ \odot \cos 2\alpha \\ &-0.000\ 0107\ \cos 2\ \odot \sin 2\alpha \end{aligned} \right\} \tan^2 \delta$ $\left. \begin{aligned} &+0.000\ 0620\ \sin 2\ \odot \cos 2\alpha \\ &-0.000\ 0622\ \cos 2\ \odot \sin 2\alpha \end{aligned} \right\} \sec^2 \delta$ $\left. \begin{aligned} &+0.000\ 0513\ \sin (\odot + \odot) \cos 2\alpha \\ &-0.000\ 0507\ \cos (\odot + \odot) \sin 2\alpha \\ &+0.000\ 0097\ \sin (\odot - \odot) \cos 2\alpha \\ &-0.000\ 0053\ \cos (\odot - \odot) \sin 2\alpha \end{aligned} \right\} \tan \delta \sec \delta$	$\left. \begin{aligned} &+0.000\ 975\ \tau^2 \sin^2 \alpha \\ &-0.000\ 023\ \cos 2\ \odot \\ &-0.000\ 080\ \cos 2\ \odot \cos 2\alpha \\ &-0.000\ 077\ \sin 2\ \odot \sin 2\alpha \end{aligned} \right\} \tan \delta$ $\left. \begin{aligned} &+0.000\ 040\ \cos 2\ \odot \\ &-0.000\ 467\ \cos 2\ \odot \cos 2\alpha \\ &-0.000\ 465\ \sin 2\ \odot \sin 2\alpha \end{aligned} \right\}$ $\left. \begin{aligned} &-0.000\ 039\ \cos (\odot + \odot) \\ &-0.000\ 380\ \cos (\odot + \odot) \cos 2\alpha \\ &-0.000\ 385\ \sin (\odot + \odot) \sin 2\alpha \\ &-0.000\ 380\ \cos (\odot - \odot) \\ &-0.000\ 040\ \cos (\odot - \odot) \cos 2\alpha \\ &-0.000\ 072\ \sin (\odot - \odot) \sin 2\alpha \end{aligned} \right\} \sin \delta \tan \delta$

These terms are negligible for stars whose declination is numerically less than  $80^\circ$ , but in computing the apparent places given in the American Ephemeris they have been applied whenever sensible.

The *apparent* places of seven stars have been corrected for the effect of annual parallax. These stars, with the adopted values of the annual parallax, are—

$\tau$ Ceti . . . . .	0.31	$\alpha$ Centauri . . . . .	0.75
$\epsilon$ Eridani . . . . .	0.32	$\alpha$ Aquilæ (Altair) . . . .	0.23
$\alpha$ Canis Majoris (Sirius) . .	0.38	61 Cygni . . . . .	0.30
$\alpha$ Canis Minoris (Procyon) .	0.33		

The *apparent* places of  $\alpha$  Canis Majoris (Sirius),  $\alpha$  Canis Minoris (Procyon), and  $\alpha^2$  Centauri have been corrected for the effect of orbital motion. AUWERS'S



elements were used for Sirius and Procyon, and SEE's elements for  $\alpha^2$  Centauri. The values of these corrections are given on pages 98 and 99 of *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33, but those for Sirius and Procyon need an additional correction to refer them to the center of the orbit before they are applicable to the mean places taken from NEWCOMB's Fundamental Catalogue. These additional corrections for Sirius and Procyon were omitted in the *Star List of the American Ephemeris* [Supplement to the *American Ephemeris and Nautical Almanac*] for 1910 and 1911, and in the *American Ephemeris and Nautical Almanac* for 1912 and 1913. The values of the corrections for the three stars are—

	Sirius.		Procyon.		$\alpha^2$ Centauri.	
	1917.0	1918.0	1917.0	1918.0	1917.0	1918.0
$\Delta\alpha$	-0°.143	-0°.143	-0°.062	-0°.061	+0°.647	+0°.634
$\Delta\delta$	-0''.59	-0''.72	+0''.05	+0''.18	+5''.98	+5''.70

These corrections have not been applied to the mean places as published in this volume.

The stars occulted by the Moon have been selected from the *Catalogue of Zodiacal Stars* contained in Vol. VIII, part 3, *Astronomical Papers of the American Ephemeris*, and the mean places for 1917.0 have been derived from the same catalogue.

In Part III the elements of eclipses of the Sun and occultations of stars by the Moon are given in accordance with BESSEL's method, the special forms employed being a modification of those developed in CHAUVENET's *Spherical and Practical Astronomy*.

In the computation of the elements of Eclipses, the following corrections to the longitude, latitude, and parallax of the Moon, deduced by NEWCOMB from recent observations of occultations of stars by the Moon, *Astronomical Papers of the American Ephemeris*, Vol. IX, part 1, have been applied. These corrections have been assumed in each case to be constant during the eclipse.

G. M. T.	$\delta v$	$\delta \delta$	$\delta \pi$
1917	"	"	"
Jan. 7 <sup>d</sup> 20 <sup>h</sup>	+8.4	+1.3	+0.40
Jan. 22 20	+7.6	0.0	+0.50
June 19 1	+6.3	+1.3	+0.43
July 4 10	+7.0	0.0	+0.48
July 18 15	+6.6	+1.6	+0.41
Dec. 13 21	+7.5	-0.1	+0.46
Dec. 27 22	+7.8	+1.4	+0.44

The elongations of the satellites of Mars are derived from elements given by H. STRUVE in *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, 1911, page 1073.

The conjunctions and phenomena of Jupiter's four brighter satellites are derived from SAMPSON's tables. The configurations are derived from a continuation of DAMOISEAU's tables by M. POTTIER.

The elongations of the Vth satellite of Jupiter are derived from unpublished elements deduced from the observations of BARNARD.

The differential coordinates of Jupiter's VIth and VIIth satellites are derived from elements and tables given in *Lick Observatory Bulletin*, 1906, Vol. IV, No. 112, and in *Astronomische Nachrichten*, 1907, Vol. 174, page 359, respectively.

The positions of the rings and the elongations and conjunctions of the satellites of Saturn are derived from elements given by H. STRUVE in *Observations de Poulkova*, Supplement 1, St. Petersburg, 1888; *Publications de Poulkovo*, Second Series, Vol. XI, St. Petersburg, 1898; with corrections communicated by H. STRUVE to the *Berliner Jahrbuch*. The differential coordinates of Phœbe are derived from elements and tables given in *Annals of Harvard College Observatory*, 1905, Vol. LIII, No. VI.

The apparent outer dimensions ( $a$  and  $b$ ) of the rings of Saturn are also according to STRUVE; the relative dimensions of the rings are computed from BESSEL's data, except those for the dusky ring, which are based on the observations of various astronomers.

The elongations of Ariel and Umbriel, the inner satellites of Uranus, are derived from the data of NEWCOMB's *Uranian and Neptunian Systems*, *Washington Observations*, 1873, Appendix I. The elongations of Titania and Oberon, the outer satellites of Uranus, are derived from elements given by H. STRUVE in *Abhandlungen der K. Preussischen Akademie der Wissenschaften*, 1912.

The elongations of the satellite of Neptune are derived from elements given by A. HALL in the *Astronomical Journal*, 1898, Vol. XIX, page 65.

The adopted apparent semidiameter of the Sun at the Earth's mean distance is  $16' 1''.50$ , while in the computation of eclipses the value given by AUWERS in the *Astronomische Nachrichten*, 1891, Vol. 128, page 367, is employed, viz.,  $15' 59''.63$ .

In the computation of the ephemeris for physical observations of the Sun the following elements by CARRINGTON have been used:

Inclination of the Sun's equator to the ecliptic . . . . .	$7^{\circ} 15'$
Longitude of the ascending node of the Sun's equator on the ecliptic . . . . .	$73^{\circ} 40' + 50''.25 (t-1850)$
Sidereal period of rotation (mean solar days) . . . . .	$25^d.38$

The apparent semidiameter of the Moon is computed from the Moon's equatorial horizontal parallax,  $\pi$ , by the formula,

$$S = 0.272\ 506\ \pi + 1''.50$$

where the constant 0.272 506 is based on data from occultations given by J. PETERS in the *Astronomische Nachrichten*, 1895, Vol. 138, page 147; and the constant  $1''.50$  is added to cover the average effect of irradiation.

The value of the Moon's semidiameter employed in the computation of eclipses is computed from the formula,

$$\sin S = 0.272\ 274\ \sin \pi$$

In the computation of the ephemeris for physical observations of the Moon, the following notation and formulæ have been used, the value of  $I$  and the formulæ for physical libration being those given by F. HAYN in *Abhandlungen der K. Sächsischen Gesell. der Wissenschaften*, Vols. 29 and 30, 1904, 1907:

$I$ —the inclination of the Moon's mean equator to the ecliptic ( $=1^{\circ} 32'.1$ ),

$\Omega$ —the longitude of the ascending node of the Moon's orbit, or the longitude of the descending node of the Moon's mean equator,

$C$ —the angle at the center of the Moon's disk made by a lunar meridian with the circle of declination, counted from north to east,

$\lambda, \beta, \alpha, \delta$ —the geocentric longitude, latitude, right ascension, and declination of the Moon,

- $i$  = the inclination of the Moon's mean equator to the Earth's true equator,  
 $d$  = the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic,  
 $\Omega$  = the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator,  
 $\mathcal{C}$  = the Moon's mean longitude, referred to the mean equinox,  
 $g$  = the Earth's mean anomaly,  
 $g$  = the Moon's mean anomaly,  
 $\omega$  = the angular distance of the perigee of the Moon's orbit from its ascending node on the ecliptic,  
 $b, l$  = the optical librations in latitude and longitude, respectively,  
 $\delta b, \delta l$  = the physical librations in latitude and longitude, respectively,  
 $b + \delta b$  = the Moon's geocentric libration in latitude = the Earth's selenographic latitude,  
 $l + \delta l$  = the Moon's geocentric libration in longitude = the Earth's selenographic longitude,  
 $\delta C$  = the physical libration of  $C$ ,  
 $\mu = -0'.617 \sin 2(\Omega - \lambda)$ ,  
 $A = \sin I \cos(\Omega - \lambda)$ ,  
 $\tan B = \tan I \sin(\Omega - \lambda)$ ,  
 $\lambda' = \lambda + \mu + Ab$ ,  
 $b = B - \beta$ ,  
 $l = \lambda' - \mathcal{C}$ ,  
 $\sin C' = \sin i \frac{\cos(\lambda' + d - \Omega)}{\cos \delta} = -\sin i \frac{\cos(\alpha - \Omega)}{\cos b}$ ,  
 $\delta b = +108'' \sin(\omega + l) + 37'' \sin(\omega - l) - 11'' \sin(g + \omega - l)$ ,  
 $\delta l = +12'' \sin g - 59'' \sin g' - 18'' \sin 2\omega$ ,  
 $-[108'' \cos(\omega + l) - 37'' \cos(\omega - l) + 11'' \cos(g + \omega - l)] \tan b$ ,  
 $\delta C = -[108'' \cos(\omega + l) - 37'' \cos(\omega - l) + 11'' \cos(g + \omega - l)] \sec b$ ,  
 $C = C' + \delta C$ .

The Sun's selenographic latitude and longitude have been computed from formulæ the same as those given above except that the heliocentric coordinates of the Moon have been substituted for the geocentric coordinates.

The following elements have been used in computing the ephemerides for physical observations of the planets Mars and Jupiter:

Position of north pole of Mars . . . . .	$\left\{ \begin{array}{l} \alpha = 21^{\text{h}} 10^{\text{m}} 0^{\text{s}} + 1^{\text{s}}.565(t-1905) \\ \delta = 54^{\circ} 30' 0'' + 12''.60(t-1905) \end{array} \right.$
Position of north pole of Jupiter . . . . .	$\left\{ \begin{array}{l} \alpha = 17^{\text{h}} 52^{\text{m}} 0^{\text{s}}.84 + 0^{\text{s}}.247(t-1910) \\ \delta = 64^{\circ} 33' 34''.6 - 0''.60(t-1910) \end{array} \right.$
Rotation period of Mars . . . . .	$24^{\text{h}} 37^{\text{m}} 22^{\text{s}}.65$
Rotation period of Jupiter { System I. . . . .	$9^{\text{h}} 50^{\text{m}} 30^{\text{s}}.004$
{ System II. . . . .	$9^{\text{h}} 55^{\text{m}} 40^{\text{s}}.632$
Longitude of Central Meridian of Mars, May 15, 1897, Greenwich Mean Noon . . . . .	$52^{\circ}.01$
Longitude of Central Meridian of Jupiter (System I.), July 14, 1897, Greenwich Mean Noon . . . . .	$47^{\circ}.31$
Longitude of Central Meridian of Jupiter (System II.), July 14, 1897, Greenwich Mean Noon . . . . .	$96^{\circ}.58$

The position of the north pole of Mars is as given by LOWELL and CROMMELIN (see *Monthly Notices R. A. S.*, 1905, Vol. 66, page 56), while that of the north pole of Jupiter has been deduced from the position given by DAMOISEAU for 1750 (see *Tables Écliptiques des Satellites de Jupiter*, page (1)). The rotation periods of Mars and of Jupiter and the longitudes of the central meridians are according to MARTH (see *Monthly Notices R. A. S.*, 1896, Vol. 56, pages 395-403 and 517-524). The longitude of the Great Red Spot and the time of its transit across the Central Meridian given in the volumes for 1913 and 1914

have been replaced by those of System II. of MARTH. This change has been made in view of the following facts: The Paris Conference of October, 1911, assigned to the office of the American Ephemeris and Nautical Almanac the preparation of the ephemerides for the physical observations of the planets; a general desire exists that the use of System II. of MARTH should not be discontinued; and the position of the Great Red Spot during the opposition of 1912 was about  $70^\circ$  from the place predicted from the elements adopted in the *American Ephemeris and Nautical Almanac* for 1913.

The adopted semidiameters of the planets, with the authority for each, are given on page xix. Their stellar magnitudes have been computed from formulæ given by G. MUELLER in *Publicationen des Astrophysikalischen Observatoriums zu Potsdam*, 1893, Vol. 8, page 366.

In the list of observatories the authority for the various positions is given in each case. The latitudes given are in most cases astronomical. In some instances they have been determined by geodetic triangulation from other points. The reductions from geographic to geocentric latitude,  $\varphi' - \varphi$ , and the distance from the center of the earth,  $\rho$ , are computed from the formulæ on page xviii, using the flattening  $\frac{1}{297}$  obtained by JOHN F. HAYFORD in *Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy*, U. S. Coast and Geodetic Survey, 1910, and adopted by the *Paris Conference*, October, 1911.

## ANNIVERSARIES AND FESTIVALS, 1917.

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New Year's Day . . . . .	Monday, Jan. 1.
Epiphany . . . . .	Saturday, Jan. 6.
Septuagesima Sunday . . . . .	Sunday, Feb. 4.
Lincoln's Birthday . . . . .	Monday, Feb. 12.
Quinquagesima (Shrove Sunday) . . . . .	Sunday, Feb. 18.
Ash Wednesday . . . . .	Wednesday, Feb. 21.
Washington's Birthday . . . . .	Thursday, Feb. 22.
Palm Sunday . . . . .	Sunday, Apr. 1.
Good Friday . . . . .	Friday, Apr. 6.
First Day of Passover . . . . .	Saturday, Apr. 7.
Easter Sunday . . . . .	Sunday, Apr. 8.
Rogation Sunday . . . . .	Sunday, May 13.
Ascension Day (Holy Thursday) . . . . .	Thursday, May 17.
Hebrew Pentecost (Shebuoth) . . . . .	Sunday, May 27.
Pentecost (Whit Sunday) . . . . .	Sunday, May 27.
Memorial Day . . . . .	Wednesday, May 30.
Trinity Sunday . . . . .	Sunday, June 3.
Corpus Christi . . . . .	Thursday, June 7.
Independence Day . . . . .	Wednesday, July 4.
Labor Day (except in certain States) . . . . .	Monday, Sept. 3.
Hebrew New Year (Rosh Hashanah) . . . . .	Monday, Sept. 17.
Day of Atonement (Yom Kippur) . . . . .	Wednesday, Sept. 26.
First Day of Tabernacle (Sucoth) . . . . .	Monday, Oct. 1.
Election Day (in certain States) . . . . .	Tuesday, Nov. 6.
Thanksgiving Day . . . . .	Thursday, Nov. 29.
First Sunday in Advent . . . . .	Sunday, Dec. 2.
Christmas Day . . . . .	Tuesday, Dec. 25.

# CHRONOLOGICAL ERAS AND CYCLES.

## CHRONOLOGICAL ERAS.

THE YEAR 1917, WHICH COMPRISES THE LATTER PART OF THE 141ST AND THE BEGINNING OF THE 142D YEAR OF THE INDEPENDENCE OF THE UNITED STATES OF AMERICA, CORRESPONDS TO—

The year 6630 of the Julian period;

- “ 7425–7426 of the Byzantine era, the year 7426 commencing on September 1;
- “ 5677–5678 of the Jewish era, the year 5678 commencing on September 17, or, more exactly, at sunset on September 16;
- “ 2670 since the foundation of Rome, according to VARRO;
- “ 2664 since the beginning of the era of NABONASSAR, which has been assigned to Wednesday, the 26th of February of the 3967th year of the Julian Period; corresponding in the notation of chronologists, to the 747th, and, in the notation of astronomers, to the 746th year before the birth of CHRIST;
- “ 2693 of the Olympiads, or the first year of the 674th Olympiad, commencing in July, 1917, if we fix the era of the Olympiads at 775½ years before CHRIST, or near the beginning of July of the year 3938 of the Julian period;
- “ 2229 of the Grecian era, or the era of the SELEUCIDÆ, which began near the vernal equinox of the year, – 311 = B. C. 312, = 4402 of the Julian period;
- “ 1633 of the era of DIOCLETIAN;
- “ 2577 of the Japanese era and to the 6th year of the period entitled Taisho.

The year 1336 of the Mohammedan era, or the era of the Hegira, begins on the 17th day of October, 1917.

The first day of January of the year 1917 is the 2,421,230th day since the commencement of the Julian Period.

## CHRONOLOGICAL CYCLES.

Dominical Letter . . . . .	G	Solar Cycle . . . . .	22
Epact . . . . .	6	Roman Indiction.. . . .	15
Lunar Cycle or Golden Number	18	Julian Period . . . . .	6630

# ASTRONOMICAL CONSTANTS.

Solar Parallax . . . . .	8.80	} Paris Conference.
Constant of Nutation . . . . .	9.21	
Constant of Aberration . . . . .	20.47	
General Precession . . . . .	$50''.2564 + 0''.000222(t-1900)$	} Newcomb.
Obliquity of the Ecliptic . . . . .	$23^\circ 27' 8''.26 - 0''.4684(t-1900)$	
Equatorial Horizontal Parallax of the Moon . . . . .	$57' 2''.63^*$	(Newcomb)

Mean distance Earth to Moon 384 411 kilometers=238 862 miles, or 60.2678 radii.

Mean distance Earth to Sun 149 504 201 kilometers=92 897 416 statute miles.

Velocity of light 299 860 kilometers=186 324 statute miles per second (Newcomb and Michelson).

Light travels unit distance in 498<sup>s</sup>.580.

Gaussian Gravitation Constant,  $\dagger k=0.017\ 202\ 099=3\ 548''.187\ 61$ .

Acceleration in one second due to gravity,  $g=9.8060-\frac{m}{R}0.0260\cos 2\varphi-\frac{2h}{R}g.\dagger$  }  
 Length of seconds pendulum,  $l=0.993\ 549-\frac{m}{R}0.002\ 631\cos 2\varphi-\frac{2h}{R}l.\dagger$  } Helmert.

Length of the year:		
Tropical (ordinary) . . . . .	$365.242\ 198\ 79-0.000\ 000\ 0614(t-1900)$	} Newcomb.
Sidereal . . . . .	$365.256\ 360\ 42+0.000\ 000\ 0011(t-1900)$	
Anomalistic . . . . .	$365.259\ 641\ 34+0.000\ 000\ 0304(t-1900)$	
Eclipse . . . . .	$346.620\ 000\ +0.000\ 000\ 36(t-1900)$	

Length of the month:															
Synodical (ordinary)	.	.	.	.	.	.	29.530	588=	29	12	44	2.8	Hansen.		
Tropical	.	.	.	.	.	.	27.321	582=	27	7	43	4.7			
Sidereal	.	.	.	.	.	.	27.321	661=	27	7	43	11.5			
Anomalistic	.	.	.	.	.	.	27.554	550=	27	13	18	33.1			
Nodical	.	.	.	.	.	.	27.212	219=	27	5	5	35.7			

Length of the day:				
Sidereal . . . . .	23	56	4.091	of mean solar time.
Mean Solar . . . . .	24	3	56.555	of sidereal time.

Dimensions of the Earth (Hayford's Spheroid of 1909):

Equatorial Radius,  $a=6378.388$  kilometers or  $3963.34$  statute miles.

Polar Radius,  $b=6356.909$  " or  $3949.99$  " "

Flattening,  $\frac{a-b}{a}=\frac{1}{297.0}$

Logarithm of the eccentricity  $\frac{\sqrt{a^2-b^2}}{a}=\log e=8.913\ 804$

Logarithm radius= $\log \rho=9.999\ 2695+0.000\ 7324\cos 2\varphi-0.000\ 0019\cos 4\varphi$ .

Reduction from geographic latitude  $\varphi$  to geocentric latitude  $\varphi'$ ,  
 $\varphi'-\varphi=-11'35''.66\sin 2\varphi+1''.17\sin 4\varphi$ .

1 meter=3.280 8333 feet. 1 foot=0.304 8006 meters.

1 statute mile=0.868 362 nautical or geographical miles.

1 nautical mile=1.151 594 statute miles.

\* Used in the computation of eclipses. The parallax used in the computation of the ephemeris of the Moon contained in this volume is  $57' 2''.23$  (Hansen).

$\dagger k^2$  is the acceleration due to the Sun's attraction at the mean distance of the Earth from the Sun, which is also the astronomical unit of distance, the unit of time being one mean solar day.

$\dagger \varphi$ =latitude,  $h$ =elevation above sea level in meters, and  $\log R=6.80416$ .

NOTE.—The above values of  $\log \rho$  and  $\varphi'-\varphi$  were computed with the eccentricity that results from assuming that the flattening of the earth is exactly  $\frac{1}{297}$ .

# ASTRONOMICAL CONSTANTS.

## SEMI-DIAMETERS OF THE SUN, MOON, AND PLANETS.

Name.	At Unit Distance.	At Mean Least Distance.	In Kilometers.	In Statute Miles.	Authority.
Sun . . . . .	15 59.63	. .	695 553.46	432 196.01	Auwers.
Moon . . . . .	15 32.58*	. .	1 738.02	1 079.96	Newcomb.
Mercury . . . . .	3.34	5.45	2 420.89	1 504.27	Le Verrier.
Venus . . . . .	8.55	30.90	6 197.18	3 850.74	Peirce.
Mars . . . . .	5.05	9.64	3 660.32	2 274.42	Peirce.
Jupiter (Equatorial) . . . . .	1 40.20	23.84	72 626.64	45 128.01	Am. Eph.
Jupiter (Polar) . . . . .	1 34.12	22.40	68 219.76	42 389.71	Peirce.
Saturn (Equatorial) . . . . .	1 24.88	9.94	61 522.45	38 228.20	Barnard.
Saturn (Polar) . . . . .	1 17.47	9.07	56 151.56	34 890.89	Barnard.
Uranus . . . . .	33.52	1.84	24 295.86	15 096.72	Am. Eph.
Neptune . . . . .	38.66	1.33	28 021.42	17 411.67	Am. Eph.

## ELEMENTS OF THE PLANETARY ORBITS FOR THE EPOCH 1917 —January 0<sup>d</sup> G. M. T.

Name.	Mean Distance.	Sidereal Period in Tropical Years.	Sidereal Mean Daily Motion.	Synodic Period in Tropical Years.	Eccentricity.
♿ Mercury . . . . .	0.387 099	0.240 85	14 732.420	0.317 26	0.205 6177
♀ Venus . . . . .	0.723 331	0.615 21	5 767.670	1.598 72	0.006 8126
⊕ Earth . . . . .	1.000 000	1.000 04	3 548.193	. . . .	0.016 7439
♂ Mars . . . . .	1.523 688	1.880 89	1 886.519	2.135 39	0.093 3244
♃ Jupiter . . . . .	5.202 803	11.862 23	299.128	1.092 11	0.048 3653
♄ Saturn . . . . .	9.538 843	29.457 72	120.455	1.035 18	0.055 8310
♅ Uranus . . . . .	19.190 978	84.015 29	42.23	1.012 09	0.047 0922
♆ Neptune . . . . .	30.070 672	164.788 29	21.53	1.006 14	0.008 5441

Name.	Inclination to the Ecliptic.	Mean Longitude of the Node.	Mean Longitude of the Perihelion.	Mean Longitude at the Epoch.	Logarithm of Mass in Unit of Sun's Mass.
♿ Mercury . . . . .	7 0 11.5	47 20 50.7	76 9 50.9	27 44 52.89	3.221 8487—10
♀ Venus . . . . .	3 23 37.7	75 55 57.5	130 24 11.4	210 37 57.16	4.389 3398—10
⊕ Earth . . . . .	. . . . .	. . . . .	101 30 47.1	99 34 51.57	4.482 2896—10
♂ Mars . . . . .	1 51 0.9	48 55 1.4	334 31 53.0	307 42 19.72	3.509 5499—10
♃ Jupiter . . . . .	1 18 28.1	99 36 35.2	12 59 7.6	34 12 1.58	6.979 9082—10
♄ Saturn . . . . .	2 29 29.8	112 55 54.7	91 25 18.3	114 33 12.34	6.455 7335—10
♅ Uranus . . . . .	0 46 22.0	73 34 32.6	169 19 14.1	316 26 34.40	5.640 7528—10
♆ Neptune . . . . .	1 46 30.4	130 51 56.8	43 54 15.2	122 24 2.19	5.705 5338—10

The elements of the four inner planets are derived from those given by NEWCOMB in Vol. VI of the *Astronomical Papers of the American Ephemeris*, and are the same as those used in computing the ephemerides of these planets. Those of Jupiter, Saturn, Uranus, and Neptune are taken from Vol. VII of the *Astronomical Papers* for the epoch of the tables. They are reduced to 1917 by applying LE VERRIER'S variations, and can not be regarded as being strictly identical with the elements used in computing the ephemerides of those planets in this volume.

\* At mean distance. See *Ast. Papers Am. Eph.*, Vol. IX, p. 39. For the values of the semidiameter used in this volume see page xlii.



# SYMBOLS AND ABBREVIATIONS.

## SIGNS OF THE PLANETS, ETC.

☉	The Sun.	♂	Mars.
☾	The Moon.	♃	Jupiter.
☿	Mercury.	♄	Saturn.
♀	Venus.	♅	Uranus.
♁	The Earth.	♆	Neptune.

## SIGNS OF THE ZODIAC.

Spring Signs.	{	1.	♈	Aries.	Autumn Signs.	{	7.	♎	Libra.
		2.	♉	Taurus.			8.	♏	Scorpius.
		3.	♊	Gemini.			9.	♐	Sagittarius.
Summer Signs.	{	4.	♋	Cancer.	Winter Signs.	{	10.	♑	Capricornus.
		5.	♌	Leo.			11.	♒	Aquarius.
		6.	♍	Virgo.			12.	♓	Pisces.

## ASPECTS.

- ♌ Conjunction, or having the same Longitude or Right Ascension.
- ☐ Quadrature, or differing  $\pm 90^\circ$  in Longitude or Right Ascension.
- ♌ Opposition, or differing  $180^\circ$  in Longitude or Right Ascension.

## ABBREVIATIONS.

♊	Ascending Node.	°	Degrees.
♋	Descending Node.	'	Minutes of Arc.
N.	North.	"	Seconds of Arc.
S.	South.	h	Hours.
E.	East.	m	Minutes of Time.
W.	West.	s	Seconds of Time.

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## PART I.

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# ASTRONOMICAL EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Jan. 1	Mo	18 45 50.11	11.041	-23 1 56.7	+12.09	16 17.87	8.95	- 3 34.47	-1.184	18 42 15.64
2	Tu	18 50 14.92	11.026	22 56 52.8	13.23	16 17.88	8.95	4 2.72	1.170	18 46 12.20
3	We	18 54 39.37	11.011	22 51 21.6	14.37	16 17.88	8.95	4 30.61	1.154	18 50 8.75
4	Th	18 59 3.42	10.994	22 45 23.2	15.50	16 17.88	8.95	4 58.11	1.137	18 54 5.31
5	Fr	19 3 27.06	10.976	22 38 57.7	16.62	16 17.87	8.95	5 25.19	1.119	18 58 1.87
6	Sa	19 7 50.25	10.967	-22 32 5.4	+17.74	16 17.85	8.95	- 5 51.83	-1.100	19 1 58.43
7	Su	19 12 12.98	10.937	22 24 46.4	18.84	16 17.83	8.95	6 17.99	1.080	19 5 54.99
8	Mo	19 16 35.22	10.916	22 17 1.0	19.94	16 17.80	8.95	6 43.67	1.059	19 9 51.54
9	Tu	19 20 56.94	10.894	22 8 49.3	21.03	16 17.77	8.95	7 8.83	1.037	19 13 48.10
10	We	19 25 18.12	10.871	22 0 11.6	22.11	16 17.73	8.95	7 33.46	1.015	19 17 44.66
11	Th	19 29 38.75	10.848	-21 51 8.2	+23.18	16 17.68	8.95	- 7 57.53	-0.991	19 21 41.22
12	Fr	19 33 58.80	10.823	21 41 39.2	24.24	16 17.63	8.95	8 21.02	0.967	19 25 37.78
13	Sa	19 38 18.25	10.798	21 31 44.9	25.28	16 17.57	8.95	8 43.92	0.941	19 29 34.33
14	Su	19 42 37.09	10.772	21 21 25.7	26.32	16 17.51	8.95	9 6.20	0.915	19 33 30.89
15	Mo	19 46 55.30	10.745	21 10 41.7	27.34	16 17.44	8.95	9 27.85	0.888	19 37 27.45
16	Tu	19 51 12.85	10.717	-20 59 33.3	+28.35	16 17.36	8.95	- 9 48.84	-0.861	19 41 24.01
17	We	19 55 29.73	10.689	20 48 0.8	29.35	16 17.28	8.94	10 9.17	0.833	19 45 20.57
18	Th	19 59 45.93	10.660	20 36 4.4	30.34	16 17.20	8.94	10 28.81	0.804	19 49 17.12
19	Fr	20 4 1.42	10.631	20 23 44.6	31.31	16 17.11	8.94	10 47.75	0.774	19 53 13.68
20	Sa	20 8 16.20	10.601	20 11 1.7	32.27	16 17.02	8.94	11 5.97	0.744	19 57 10.24
21	Su	20 12 30.25	10.570	-19 57 55.9	+33.21	16 16.92	8.94	-11 23.45	-0.713	20 1 6.79
22	Mo	20 16 43.54	10.538	19 44 27.8	34.13	16 16.82	8.94	11 40.19	0.681	20 5 3.35
23	Tu	20 20 56.06	10.506	19 30 37.7	35.04	16 16.72	8.94	11 56.15	0.649	20 8 59.91
24	We	20 25 7.80	10.473	19 16 25.9	35.94	16 16.61	8.94	12 11.33	0.616	20 12 56.47
25	Th	20 29 18.74	10.439	19 1 52.9	36.81	16 16.51	8.94	12 25.72	0.583	20 16 53.02
26	Fr	20 33 28.87	10.405	-18 46 59.0	+37.67	16 16.39	8.94	-12 39.29	-0.549	20 20 49.58
27	Sa	20 37 38.18	10.371	18 31 44.7	38.51	16 16.28	8.94	12 52.05	0.514	20 24 46.14
28	Su	20 41 46.66	10.336	18 16 10.4	39.34	16 16.16	8.93	13 3.97	0.479	20 28 42.69
29	Mo	20 45 54.31	10.302	18 0 16.4	40.15	16 16.03	8.93	13 15.06	0.445	20 32 39.25
30	Tu	20 50 1.13	10.267	17 44 3.2	40.95	16 15.91	8.93	13 25.32	0.410	20 36 35.80
31	We	20 54 7.10	10.231	-17 27 31.1	+41.72	16 15.77	8.93	-13 34.74	-0.375	20 40 32.36
Feb. 1	Th	20 58 12.23	10.196	17 10 40.7	42.48	16 15.64	8.93	13 43.32	0.340	20 44 28.92
2	Fr	21 2 16.53	10.162	16 53 32.2	43.23	16 15.49	8.93	13 51.06	0.305	20 48 25.47
3	Sa	21 6 20.00	10.127	16 36 6.0	43.96	16 15.35	8.93	13 57.97	0.271	20 52 22.03
4	Su	21 10 22.63	10.092	16 18 22.6	44.66	16 15.19	8.93	14 4.05	0.236	20 56 18.58
5	Mo	21 14 24.44	10.058	-16 0 22.3	+45.36	16 15.03	8.92	-14 9.31	-0.202	21 0 15.14
6	Tu	21 18 25.44	10.025	15 42 5.6	46.03	16 14.87	8.92	14 13.75	0.168	21 4 11.70
7	We	21 22 25.63	9.991	15 23 32.8	46.70	16 14.70	8.92	14 17.38	0.135	21 8 8.25
8	Th	21 26 25.02	9.958	15 4 44.3	47.34	16 14.53	8.92	14 20.21	0.101	21 12 4.81
9	Fr	21 30 23.61	9.925	14 45 40.5	47.97	16 14.35	8.92	14 22.25	0.069	21 16 1.36
10	Sa	21 34 21.43	9.893	-14 26 21.8	+48.58	16 14.16	8.92	-14 23.51	-0.036	21 19 57.92
11	Su	21 38 18.48	9.861	14 6 48.7	49.18	16 13.98	8.91	14 24.00	-0.004	21 23 54.47
12	Mo	21 42 14.76	9.829	13 47 1.5	49.76	16 13.79	8.91	14 23.73	+0.027	21 27 51.03
13	Tu	21 46 10.30	9.799	13 27 0.5	50.32	16 13.59	8.91	14 22.72	0.058	21 31 47.58
14	We	21 50 5.11	9.769	13 6 46.3	50.86	16 13.39	8.91	14 20.97	0.088	21 35 44.14
15	Th	21 53 59.20	9.739	-12 46 19.2	+51.39	16 13.18	8.91	-14 18.50	+0.118	21 39 40.69
16	Fr	21 57 52.57	9.709	-12 25 39.6	+51.90	16 12.97	8.90	-14 15.32	+0.147	21 43 37.25

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber. ration.	True Oblivity.	Mean Time of Sidereal Noon.
		" "	" "	" "			" "	" "	" "	23° 27'	h m s
Jan.	1	280 32 24.7	152.89	+0.63	9.992 6701	- 2.0	0.08	+16.48	20.81	3.04	5 16 52.31
	2	281 33 34.0	152.88	0.62	9.992 6664	- 1.0	0.22	16.53	20.81	3.04	5 12 56.40
	3	282 34 43.0	152.87	0.57	9.992 6652	0.0	0.36	16.58	20.81	3.03	5 9 0.48
	4	283 35 51.7	152.86	0.50	9.992 6666	+ 1.1	0.49	16.63	20.81	3.03	5 5 4.57
	5	284 37 0.2	152.85	0.41	9.992 6707	2.3	0.63	16.68	20.81	3.04	5 1 8.66
	6	285 38 8.4	152.84	+0.30	9.992 6776	+ 3.5	0.77	+16.72	20.81	3.04	4 57 12.75
	7	286 39 16.3	152.83	0.18	9.992 6873	4.6	0.90	16.77	20.81	3.04	4 53 16.84
	8	287 40 24.1	152.82	+0.05	9.992 6997	5.7	1.04	16.82	20.81	3.04	4 49 20.92
	9	288 41 31.6	152.81	-0.07	9.992 7149	6.9	1.18	16.86	20.81	3.04	4 45 25.01
	10	289 42 38.9	152.80	0.20	9.992 7329	8.1	1.32	16.91	20.81	3.04	4 41 29.10
	11	290 43 45.9	152.79	-0.31	9.992 7536	+ 9.2	1.45	+16.95	20.81	3.05	4 37 33.19
	12	291 44 52.8	152.78	0.41	9.992 7770	10.3	1.59	16.99	20.81	3.05	4 33 37.28
	13	292 45 59.5	152.78	0.48	9.992 8030	11.4	1.73	17.03	20.81	3.05	4 29 41.36
	14	293 47 6.0	152.77	0.52	9.992 8315	12.4	1.87	17.07	20.80	3.06	4 25 45.45
	15	294 48 12.3	152.76	0.54	9.992 8624	13.4	2.00	17.11	20.80	3.07	4 21 49.54
	16	295 49 18.3	152.75	-0.53	9.992 8957	+14.3	2.14	+17.15	20.80	3.07	4 17 53.63
	17	296 50 24.1	152.74	0.49	9.992 9311	15.2	2.28	17.18	20.80	3.08	4 13 57.72
	18	297 51 29.7	152.72	0.42	9.992 9686	16.0	2.42	17.22	20.80	3.09	4 10 1.81
	19	298 52 34.9	152.71	0.32	9.993 0080	16.8	2.55	17.25	20.80	3.09	4 6 5.89
	20	299 53 39.7	152.69	0.20	9.993 0492	17.5	2.69	17.28	20.79	3.10	4 2 9.98
	21	300 54 44.0	152.67	-0.07	9.993 0919	+18.1	2.83	+17.31	20.79	3.11	3 58 14.07
	22	301 55 47.8	152.64	+0.06	9.993 1362	18.7	2.97	17.34	20.79	3.12	3 54 18.16
	23	302 56 50.9	152.61	0.20	9.993 1818	19.3	3.10	17.37	20.79	3.12	3 50 22.25
	24	303 57 53.2	152.58	0.33	9.993 2288	19.9	3.24	17.40	20.79	3.13	3 46 26.34
	25	304 58 54.5	152.53	0.44	9.993 2772	20.5	3.38	17.42	20.78	3.14	3 42 30.43
	26	305 59 54.8	152.49	+0.54	9.993 3271	+21.1	3.52	+17.44	20.78	3.15	3 38 34.52
	27	307 0 54.1	152.44	0.60	9.993 3786	21.8	3.66	17.46	20.78	3.16	3 34 38.60
	28	308 1 52.1	152.39	0.63	9.993 4318	22.5	3.79	17.48	20.78	3.17	3 30 42.69
	29	309 2 48.9	152.34	0.63	9.993 4867	23.3	3.93	17.50	20.77	3.18	3 26 46.78
	30	310 3 44.4	152.28	0.61	9.993 5435	24.1	4.07	17.52	20.77	3.19	3 22 50.87
	31	311 4 38.6	152.23	+0.55	9.993 6024	+25.0	4.21	+17.53	20.77	3.20	3 18 54.96
Feb.	1	312 5 31.4	152.18	0.46	9.993 6634	25.9	4.34	17.55	20.77	3.21	3 14 59.05
	2	313 6 23.0	152.12	0.35	9.993 7266	26.8	4.48	17.56	20.76	3.22	3 11 3.14
	3	314 7 13.2	152.06	0.24	9.993 7920	27.7	4.62	17.57	20.76	3.23	3 7 7.23
	4	315 8 2.0	152.01	+0.11	9.993 8598	28.7	4.76	17.58	20.76	3.24	3 3 11.32
	5	316 8 49.6	151.95	-0.02	9.993 9298	+29.7	4.89	+17.58	20.75	3.25	2 59 15.41
	6	317 9 35.9	151.90	0.14	9.994 0022	30.7	5.03	17.59	20.75	3.26	2 55 19.50
	7	318 10 20.9	151.85	0.26	9.994 0770	31.6	5.17	17.59	20.75	3.28	2 51 23.59
	8	319 11 4.6	151.80	0.36	9.994 1540	32.6	5.31	17.59	20.74	3.29	2 47 27.68
	9	320 11 47.1	151.75	0.44	9.994 2334	33.5	5.44	17.59	20.74	3.30	2 43 31.77
	10	321 12 28.4	151.70	-0.50	9.994 3149	+34.4	5.58	+17.59	20.73	3.30	2 39 35.86
	11	322 13 8.5	151.65	0.53	9.994 3986	35.3	5.72	17.59	20.73	3.31	2 35 39.95
	12	323 13 47.4	151.60	0.53	9.994 4844	36.1	5.86	17.58	20.73	3.32	2 31 44.05
	13	324 14 25.2	151.55	0.50	9.994 5721	36.9	5.99	17.58	20.72	3.33	2 27 48.14
	14	325 15 1.8	151.50	0.44	9.994 6617	37.7	6.13	17.57	20.72	3.34	2 23 52.23
	15	326 15 37.2	151.45	-0.34	9.994 7529	+38.3	6.27	+17.56	20.71	3.35	2 19 56.32
	16	327 16 11.4	151.40	-0.23	9.994 8457	+38.9	6.41	+17.55	20.71	3.36	2 16 0.41

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Feb. 16	Fr	21 57 52.57	9.709	-12 25 39.6	+51.90	16 12.97	8.90	-14 15.32	+0.147	21 43 37.25
17	Sa	22 1 45.24	9.690	12 4 48.0	52.40	16 12.76	8.90	14 11.44	0.176	21 47 33.81
18	Su	22 5 37.23	9.662	11 43 44.7	52.87	16 12.55	8.90	14 6.87	0.204	21 51 30.36
19	Mo	22 9 28.54	9.624	11 22 30.3	53.33	16 12.34	8.90	14 1.63	0.232	21 55 26.91
20	Tu	22 13 19.19	9.596	11 1 5.1	53.77	16 12.12	8.90	13 55.72	0.260	21 59 23.47
21	We	22 17 9.17	9.569	-10 39 29.7	+54.19	16 11.90	8.90	-13 49.15	+0.287	22 3 20.02
22	Th	22 20 58.51	9.543	10 17 44.3	54.59	16 11.68	8.89	13 41.94	0.314	22 7 16.57
23	Fr	22 24 47.22	9.516	9 55 49.5	54.97	16 11.46	8.89	13 34.09	0.340	22 11 13.13
24	Sa	22 28 35.29	9.490	9 33 45.8	55.33	16 11.24	8.89	13 25.61	0.366	22 15 9.68
25	Su	22 32 22.76	9.465	9 11 33.6	55.68	16 11.01	8.89	13 16.53	0.391	22 19 6.24
26	Mo	22 36 9.63	9.440	- 8 49 13.2	+56.01	16 10.78	8.88	-13 6.84	+0.416	22 23 2.79
27	Tu	22 39 55.91	9.416	8 26 45.1	56.33	16 10.55	8.88	12 56.57	0.440	22 26 59.34
28	We	22 43 41.63	9.393	8 4 9.6	56.62	16 10.32	8.88	12 45.73	0.463	22 30 55.90
Mar. 1	Th	22 47 26.80	9.371	7 41 27.3	56.90	16 10.09	8.88	12 34.34	0.485	22 34 52.45
2	Fr	22 51 11.43	9.349	7 18 38.4	57.17	16 9.85	8.88	12 22.43	0.507	22 38 49.01
3	Sa	22 54 55.56	9.328	- 6 55 43.4	+57.41	16 9.61	8.87	-12 10.00	+0.528	22 42 45.56
4	Su	22 58 39.19	9.306	6 32 42.7	57.64	16 9.37	8.87	11 57.08	0.548	22 46 42.11
5	Mo	23 2 22.36	9.286	6 9 36.6	57.86	16 9.13	8.87	11 43.69	0.567	22 50 38.67
6	Tu	23 6 5.07	9.271	5 46 25.4	58.06	16 8.88	8.87	11 29.86	0.586	22 54 35.22
7	We	23 9 47.36	9.264	5 23 9.6	58.26	16 8.63	8.87	11 15.59	0.603	22 58 31.77
8	Th	23 13 29.25	9.267	- 4 59 49.5	+58.43	16 8.38	8.86	-11 0.92	+0.619	23 2 28.33
9	Fr	23 17 10.75	9.231	4 36 25.5	58.58	16 8.12	8.86	10 45.87	0.635	23 6 24.88
10	Sa	23 20 51.89	9.207	4 12 58.0	58.72	16 7.86	8.86	10 30.45	0.650	23 10 21.43
11	Su	23 24 32.69	9.198	3 49 27.2	58.86	16 7.59	8.86	10 14.70	0.668	23 14 17.99
12	Mo	23 28 13.18	9.181	3 25 53.5	58.96	16 7.33	8.85	9 58.64	0.675	23 18 14.54
13	Tu	23 31 53.38	9.169	- 3 2 17.4	+59.06	16 7.06	8.85	- 9 42.29	+0.687	23 22 11.09
14	We	23 35 33.31	9.159	2 38 39.1	59.13	16 6.79	8.85	9 25.67	0.698	23 26 7.64
15	Th	23 39 13.00	9.149	2 14 59.1	59.20	16 6.52	8.85	9 8.80	0.708	23 30 4.20
16	Fr	23 42 52.46	9.140	1 51 17.7	59.26	16 6.24	8.84	8 51.71	0.716	23 34 0.75
17	Sa	23 46 31.73	9.123	1 27 35.2	59.29	16 5.97	8.84	8 34.42	0.724	23 37 57.30
18	Su	23 50 10.81	9.125	- 1 3 52.0	+59.31	16 5.69	8.84	- 8 16.95	+0.731	23 41 53.86
19	Mo	23 53 49.73	9.119	0 40 8.6	59.31	16 5.42	8.84	7 59.32	0.738	23 45 50.41
20	Tu	23 57 28.51	9.113	- 0 16 25.2	59.30	16 5.14	8.83	7 41.55	0.743	23 49 46.96
21	We	0 1 7.17	9.108	+ 0 7 17.6	59.27	16 4.86	8.83	7 23.65	0.748	23 53 43.52
22	Th	0 4 45.71	9.104	0 30 59.5	59.23	16 4.59	8.83	7 5.64	0.752	23 57 40.07
23	Fr	0 8 24.16	9.101	+ 0 54 40.2	+59.16	16 4.31	8.83	- 6 47.54	+0.756	0 1 36.62
24	Sa	0 12 2.54	9.098	1 18 19.2	59.09	16 4.04	8.82	6 29.36	0.759	0 5 33.17
25	Su	0 15 40.85	9.095	1 41 56.2	58.99	16 3.77	8.82	6 11.12	0.761	0 9 29.73
26	Mo	0 19 19.12	9.094	2 5 30.6	58.88	16 3.49	8.82	5 52.84	0.762	0 13 26.28
27	Tu	0 22 57.36	9.093	2 29 2.3	58.76	16 3.22	8.82	5 34.53	0.763	0 17 22.83
28	We	0 26 35.59	9.093	+ 2 52 30.8	+58.62	16 2.95	8.81	- 5 16.20	+0.763	0 21 19.39
29	Th	0 30 13.83	9.094	3 15 55.8	58.46	16 2.68	8.81	4 57.89	0.763	0 25 15.94
30	Fr	0 33 52.10	9.095	3 39 16.9	58.29	16 2.41	8.81	4 39.60	0.761	0 29 12.49
31	Sa	0 37 30.41	9.098	4 2 33.8	58.11	16 2.14	8.81	4 21.36	0.759	0 33 9.05
Apr. 1	Su	0 41 8.79	9.101	4 25 46.1	57.91	16 1.87	8.80	4 3.19	0.755	0 37 5.60
2	Mo	0 44 47.26	9.105	+ 4 48 53.5	+57.70	16 1.60	8.80	- 3 45.11	+0.751	0 41 2.15
3	Tu	0 48 25.83	9.110	+ 5 11 55.7	+57.48	16 1.32	8.80	- 3 27.13	+0.747	0 44 58.70

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber. ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" ' "	" "	" "			" "	" "	" "	23° 27'	h m s
Feb. 16	47	327 16 11.4	151.40	-0.23	9.994 8457	+32.9	6.41	+17.55	20.71	3.36	2 16 0.41
17	48	328 16 44.4	151.36	-0.10	9.994 9397	32.4	6.55	17.54	20.70	3.37	2 12 4.50
18	49	329 17 16.2	151.30	+0.04	9.995 0349	32.9	6.68	17.52	20.70	3.38	2 8 8.59
19	50	330 17 46.6	151.24	0.18	9.995 1311	40.3	6.82	17.51	20.70	3.39	2 4 12.68
20	51	331 18 15.5	151.18	0.31	9.995 2281	40.6	6.96	17.49	20.69	3.39	2 0 16.78
21	52	332 18 43.0	151.11	+0.42	9.995 3259	+40.9	7.10	+17.47	20.69	3.40	1 56 20.87
22	53	333 19 8.9	151.04	0.52	9.995 4244	41.2	7.23	17.45	20.68	3.41	1 52 24.96
23	54	334 19 33.0	150.97	0.59	9.995 5235	41.5	7.37	17.43	20.68	3.41	1 48 29.05
24	55	335 19 55.3	150.89	0.63	9.995 6234	41.8	7.51	17.41	20.67	3.42	1 44 33.14
25	56	336 20 15.8	150.81	0.63	9.995 7239	42.1	7.65	17.39	20.67	3.43	1 40 37.23
26	57	337 20 34.2	150.72	+0.60	9.995 8254	+42.5	7.78	+17.36	20.66	3.43	1 36 41.33
27	58	338 20 50.6	150.64	0.55	9.995 9278	42.9	7.92	17.34	20.66	3.44	1 32 45.42
28	59	339 21 5.0	150.56	0.47	9.996 0312	43.3	8.06	17.31	20.65	3.44	1 28 49.51
Mar. 1	60	340 21 17.4	150.47	0.36	9.996 1358	43.8	8.20	17.29	20.65	3.44	1 24 53.60
2	61	341 21 27.6	150.39	0.26	9.996 2415	44.3	8.33	17.26	20.64	3.44	1 20 57.69
3	62	342 21 35.9	150.30	+0.15	9.996 3486	+44.9	8.47	+17.23	20.64	3.45	1 17 1.79
4	63	343 21 42.0	150.21	+0.02	9.996 4569	45.4	8.61	17.20	20.63	3.45	1 13 5.88
5	64	344 21 46.2	150.13	-0.11	9.996 5667	46.0	8.75	17.17	20.63	3.45	1 9 9.97
6	65	345 21 48.3	150.05	0.22	9.996 6779	46.6	8.88	17.13	20.62	3.45	1 5 14.06
7	66	346 21 48.4	149.96	0.32	9.996 7904	47.2	9.02	17.10	20.62	3.45	1 1 18.16
8	67	347 21 46.5	149.88	-0.40	9.996 9044	+47.8	9.16	+17.07	20.61	3.45	0 57 22.25
9	68	348 21 42.7	149.80	0.46	9.997 0196	48.4	9.30	17.03	20.61	3.45	0 53 26.34
10	69	349 21 37.1	149.73	0.49	9.997 1365	48.9	9.43	17.00	20.60	3.45	0 49 30.44
11	70	350 21 29.6	149.65	0.49	9.997 2546	49.5	9.57	16.96	20.59	3.45	0 45 34.53
12	71	351 21 20.2	149.58	0.46	9.997 3740	50.0	9.71	16.92	20.59	3.44	0 41 38.62
13	72	352 21 9.2	149.50	-0.41	9.997 4946	+50.5	9.85	+16.89	20.58	3.44	0 37 42.71
14	73	353 20 56.3	149.43	0.33	9.997 6162	50.8	9.99	16.85	20.58	3.43	0 33 46.81
15	74	354 20 41.8	149.36	0.23	9.997 7386	51.2	10.12	16.81	20.57	3.43	0 29 50.90
16	75	355 20 25.6	149.29	-0.11	9.997 8619	51.5	10.26	16.77	20.57	3.42	0 25 54.99
17	76	356 20 7.8	149.22	+0.03	9.997 9857	51.7	10.40	16.74	20.56	3.42	0 21 59.09
18	77	357 19 48.2	149.15	+0.16	9.998 1099	+51.8	10.54	+16.70	20.55	3.41	0 18 3.18
19	78	358 19 26.9	149.06	0.29	9.998 2343	51.9	10.67	16.66	20.55	3.40	0 14 7.27
20	79	359 19 3.8	149.00	0.42	9.998 3588	51.8	10.81	16.62	20.54	3.39	0 10 11.36
21	80	0 18 39.0	148.93	0.52	9.998 4831	51.8	10.95	16.58	20.54	3.38	0 6 15.45
22	81	1 18 12.2	148.84	0.59	9.998 6072	51.7	11.09	16.54	20.53	3.37	0 2 19.55
23	82	2 17 43.4	148.76	+0.63	9.998 7310	+51.6	11.22	+16.50	20.52	3.36	23 54 27.73
24	83	3 17 12.6	148.67	0.64	9.998 8544	51.3	11.36	16.46	20.52	3.35	23 50 31.83
25	84	4 16 39.7	148.58	0.62	9.998 9774	51.2	11.50	16.43	20.51	3.34	23 46 35.92
26	85	5 13 4.6	148.49	0.57	9.999 1001	51.1	11.64	16.39	20.51	3.33	23 42 40.01
27	86	6 15 27.2	148.39	0.50	9.999 2226	51.0	11.77	16.35	20.50	3.32	23 38 44.11
28	87	7 14 47.5	148.31	+0.41	9.999 3450	+51.0	11.91	+16.31	20.50	3.30	23 34 48.20
29	88	8 14 5.5	148.21	0.30	9.999 4672	50.9	12.05	16.27	20.49	3.29	23 30 52.29
30	89	9 13 21.2	148.11	0.18	9.999 5894	51.0	12.19	16.24	20.48	3.27	23 26 56.38
31	90	10 12 34.6	148.01	+0.06	9.999 7118	51.0	12.32	16.20	20.48	3.26	23 23 0.48
Apr. 1	91	11 11 45.7	147.91	-0.06	9.999 8342	51.0	12.46	16.16	20.47	3.24	23 19 4.57
2	92	12 10 54.5	147.82	-0.17	9.999 9568	+51.1	12.60	+16.13	20.47	3.23	23 15 8.66
3	93	13 10 1.0	147.73	-0.27	0.000 0797	+51.2	12.74	+16.09	20.46	3.21	23 11 12.75

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h	m	s	s	°	'	"	"	'	"	m	s	h m s
Apr. 1	Su	0	41	8.79	9.101	+	4	25 46.1	+57.91	16	1.87	8.80	-4 3.19	+0.755 0 37 5.00
2	Mo	0	44	47.26	9.106		4	48 53.5	57.70	16	1.60	8.80	3 45.11	0 41 2.15
3	Tu	0	48	25.83	9.110		5	11 55.7	57.48	16	1.32	8.80	3 27.13	0 44 58.70
4	We	0	52	4.54	9.116		5	34 52.4	57.24	16	1.05	8.80	3 9.28	0 48 55.26
5	Th	0	55	43.39	9.122		5	57 43.1	56.99	16	0.78	8.79	2 51.58	0 52 51.81
6	Fr	0	59	22.41	9.130	+	6	20 27.7	+56.72	16	0.50	8.79	-2 34.05	0 56 48.36
7	Sa	1	3	1.63	9.138		6	43 5.7	56.44	16	0.23	8.79	2 16.71	1 0 44.92
8	Su	1	6	41.05	9.147		7	5 36.9	56.15	15	59.96	8.79	1 59.58	1 4 41.47
9	Mo	1	10	20.71	9.158		7	28 0.9	55.85	15	59.68	8.78	1 42.69	1 8 38.02
10	Tu	1	14	0.63	9.169		7	50 17.4	55.53	15	59.40	8.78	1 26.06	1 12 34.58
11	We	1	17	40.83	9.181	+	8	12 26.1	+55.20	15	59.13	8.78	-1 9.69	1 16 31.13
12	Th	1	21	21.32	9.193		8	34 26.7	54.85	15	58.85	8.78	0 53.63	1 20 27.69
13	Fr	1	25	2.12	9.207		8	56 18.8	54.49	15	58.57	8.77	0 37.88	1 24 24.24
14	Sa	1	28	43.26	9.222		9	18 2.1	54.12	15	58.30	8.77	0 22.47	1 28 20.79
15	Su	1	32	24.76	9.237		9	39 36.3	53.73	15	58.02	8.77	-0 7.41	1 32 17.35
16	Mo	1	36	6.62	9.262	+10	1	1.0	+53.33	15	57.75	8.77	+0 7.28	1 36 13.90
17	Tu	1	39	48.87	9.266		10	22 15.9	52.91	15	57.48	8.76	0 21.59	1 40 10.46
18	We	1	43	31.51	9.285		10	43 20.6	52.48	15	57.21	8.76	0 35.50	1 44 7.01
19	Th	1	47	14.55	9.302		11	4 14.7	52.03	15	56.95	8.76	0 49.01	1 48 3.56
20	Fr	1	50	58.02	9.320		11	24 57.9	51.57	15	56.68	8.76	1 2.10	1 52 0.12
21	Sa	1	54	41.91	9.338	+11	45	29.9	+51.09	15	56.43	8.75	+1 14.76	1 55 56.67
22	Su	1	58	26.23	9.356		12	5 50.3	50.60	15	56.17	8.75	1 26.99	1 59 53.23
23	Mo	2	2	11.00	9.375		12	25 58.6	50.09	15	55.91	8.75	1 38.78	2 3 49.78
24	Tu	2	5	56.22	9.394		12	45 54.7	49.57	15	55.66	8.75	1 50.12	2 7 46.34
25	We	2	9	41.90	9.413		13	5 38.1	49.04	15	55.41	8.74	2 0.99	2 11 42.89
26	Th	2	13	28.04	9.432	+13	25	8.5	+48.49	15	55.17	8.74	+2 11.40	2 15 39.45
27	Fr	2	17	14.66	9.453		13	44 25.6	47.96	15	54.93	8.74	2 21.33	2 19 36.00
28	Sa	2	21	1.77	9.473		14	3 29.1	47.36	15	54.69	8.74	2 30.78	2 23 32.55
29	Su	2	24	49.37	9.494		14	22 18.7	46.77	15	54.45	8.74	2 39.74	2 27 29.11
30	Mo	2	28	37.47	9.515		14	40 53.9	46.17	15	54.21	8.73	2 48.19	2 31 25.66
May 1	Tu	2	32	26.09	9.536	+14	59	14.6	+45.56	15	53.98	8.73	+2 56.13	2 35 22.22
2	We	2	36	15.22	9.558		15	17 20.5	44.93	15	53.75	8.73	3 3.55	2 39 18.77
3	Th	2	40	4.88	9.580		15	35 11.2	44.29	15	53.51	8.73	3 10.45	2 43 15.33
4	Fr	2	43	55.08	9.603		15	52 48.3	43.64	15	53.29	8.73	3 16.81	2 47 11.88
5	Sa	2	47	45.82	9.626		16	10 5.8	42.97	15	53.06	8.72	3 22.62	2 51 8.44
6	Su	2	51	37.11	9.649	+16	27	9.1	+42.30	15	52.83	8.72	+3 27.89	2 55 5.00
7	Mo	2	55	28.96	9.672		16	43 56.1	41.61	15	52.61	8.72	3 32.59	2 59 1.55
8	Tu	2	59	21.38	9.696		17	0 26.4	40.91	15	52.39	8.72	3 36.73	3 2 58.11
9	We	3	3	14.38	9.720		17	16 39.8	40.20	15	52.16	8.72	3 40.29	3 6 54.66
10	Th	3	7	7.95	9.744		17	32 36.0	39.48	15	51.94	8.71	3 43.26	3 10 51.22
11	Fr	3	11	2.12	9.769	+17	48	14.7	+38.74	15	51.73	8.71	+3 45.65	3 14 47.77
12	Sa	3	14	56.88	9.794		18	8 35.6	37.99	15	51.51	8.71	3 47.45	3 18 44.33
13	Su	3	18	52.23	9.819		18	18 38.3	37.23	15	51.30	8.71	3 48.65	3 22 40.89
14	Mo	3	22	48.18	9.844		18	33 22.7	36.46	15	51.09	8.71	3 49.26	3 26 37.44
15	Tu	3	26	44.72	9.868		18	47 48.4	35.68	15	50.88	8.70	3 49.27	3 30 34.00
16	We	3	30	41.85	9.893	+19	1	55.2	+34.88	15	50.68	8.70	+3 48.70	3 34 30.56
17	Th	3	34	39.57	9.917	+19	15	42.6	+34.07	15	50.48	8.70	+3 47.54	3 38 27.11

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber. ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	"	"			"	"	"	23° 27'	h m s
Apr. 1	91	11 11 45.7	147.91	-0.06	9.999 8342	+51.0	12.46	+16.16	20.47	3.24	23 19 4.57
2	92	12 10 54.5	147.82	0.17	9.999 9568	51.1	12.60	16.13	20.47	3.23	23 15 8.66
3	93	13 10 1.0	147.73	0.27	0.000 0797	51.2	12.74	16.09	20.46	3.21	23 11 12.75
4	94	14 9 5.3	147.63	0.35	0.000 2028	51.3	12.88	16.06	20.45	3.19	23 7 16.85
5	95	15 8 7.4	147.54	0.41	0.000 3262	51.5	13.01	16.02	20.45	3.17	23 3 20.94
6	96	16 7 7.4	147.46	-0.45	0.000 4500	+51.7	13.15	+15.99	20.44	3.15	22 59 25.03
7	97	17 6 5.3	147.37	0.46	0.000 5741	51.8	13.29	15.96	20.44	3.13	22 55 29.13
8	98	18 5 1.2	147.29	0.44	0.000 6985	51.9	13.43	15.93	20.43	3.11	22 51 33.22
9	99	19 3 55.1	147.21	0.39	0.000 8232	52.0	13.56	15.90	20.43	3.09	22 47 37.31
10	100	20 2 47.1	147.13	0.32	0.000 9482	52.1	13.70	15.87	20.42	3.07	22 43 41.40
11	101	21 1 37.3	147.05	-0.22	0.001 0734	+52.2	13.84	+15.84	20.41	3.05	22 39 45.50
12	102	22 0 25.6	146.98	-0.10	0.001 1985	52.1	13.98	15.81	20.41	3.03	22 35 49.59
13	103	22 59 12.3	146.91	+0.03	0.001 3235	52.0	14.11	15.78	20.40	3.00	22 31 53.68
14	104	23 57 57.3	146.84	0.16	0.001 4483	51.9	14.25	15.76	20.40	2.98	22 27 57.77
15	105	24 56 40.6	146.77	0.29	0.001 5727	51.7	14.39	15.73	20.39	2.96	22 24 1.86
16	106	25 55 22.3	146.70	+0.41	0.001 6963	+51.4	14.53	+15.71	20.38	2.93	22 20 5.96
17	107	26 54 2.3	146.63	0.51	0.001 8192	51.0	14.66	15.69	20.38	2.91	22 16 10.05
18	108	27 52 40.6	146.56	0.59	0.001 9412	50.6	14.80	15.67	20.37	2.89	22 12 14.14
19	109	28 51 17.2	146.49	0.63	0.002 0620	50.1	14.94	15.65	20.37	2.86	22 8 18.23
20	110	29 49 52.1	146.41	0.64	0.002 1815	49.5	15.08	15.63	20.37	2.83	22 4 22.32
21	111	30 48 25.1	146.34	+0.63	0.002 2997	+49.0	15.21	+15.61	20.36	2.81	22 0 26.42
22	112	31 46 56.2	146.26	0.59	0.002 4166	48.4	15.35	15.59	20.36	2.79	21 56 30.51
23	113	32 45 25.3	146.17	0.52	0.002 5320	47.8	15.49	15.58	20.35	2.76	21 52 34.60
24	114	33 43 52.5	146.09	0.42	0.002 6461	47.3	15.63	15.56	20.35	2.73	21 48 38.69
25	115	34 42 17.6	146.01	0.30	0.002 7590	46.7	15.76	15.55	20.34	2.71	21 44 42.78
26	116	35 40 40.7	145.92	+0.18	0.002 8705	+46.2	15.90	+15.54	20.33	2.68	21 40 46.87
27	117	36 39 1.8	145.83	+0.06	0.002 9809	45.8	16.04	15.53	20.33	2.65	21 36 50.96
28	118	37 37 20.7	145.75	-0.07	0.003 0903	45.4	16.18	15.52	20.32	2.62	21 32 55.05
29	119	38 35 37.6	145.66	0.19	0.003 1986	44.9	16.32	15.52	20.32	2.60	21 28 59.14
30	120	39 33 52.5	145.58	0.30	0.003 3059	44.5	16.45	15.51	20.31	2.57	21 25 3.24
May 1	121	40 32 5.4	145.49	-0.38	0.003 4124	+44.2	16.59	+15.50	20.31	2.54	21 21 7.33
2	122	41 30 16.2	145.41	0.44	0.003 5180	43.8	16.73	15.50	20.30	2.51	21 17 11.42
3	123	42 28 25.2	145.33	0.48	0.003 6229	43.5	16.87	15.50	20.30	2.49	21 13 15.51
4	124	43 26 32.2	145.25	0.49	0.003 7270	43.3	17.00	15.50	20.29	2.46	21 9 19.60
5	125	44 24 37.4	145.18	0.47	0.003 8306	43.0	17.14	15.50	20.29	2.43	21 5 23.69
6	126	45 22 40.9	145.11	-0.43	0.003 9335	+42.7	17.28	+15.50	20.28	2.40	21 1 27.78
7	127	46 20 42.6	145.04	0.36	0.004 0358	42.5	17.42	15.51	20.28	2.38	20 57 31.87
8	128	47 18 42.8	144.98	0.25	0.004 1375	42.3	17.55	15.51	20.27	2.35	20 53 35.96
9	129	48 16 41.4	144.91	0.14	0.004 2386	42.0	17.69	15.52	20.27	2.32	20 49 40.05
10	130	49 14 38.6	144.85	-0.01	0.004 3390	41.7	17.83	15.53	20.26	2.29	20 45 44.14
11	131	50 12 34.5	144.80	+0.12	0.004 4385	+41.3	17.97	+15.54	20.26	2.26	20 41 48.23
12	132	51 10 29.0	144.75	0.26	0.004 5371	40.8	18.10	15.55	20.25	2.24	20 37 52.32
13	133	52 8 22.4	144.69	0.37	0.004 6345	40.3	18.24	15.56	20.25	2.21	20 33 56.41
14	134	53 6 14.5	144.65	0.48	0.004 7306	39.8	18.38	15.57	20.24	2.18	20 30 0.50
15	135	54 4 5.5	144.60	0.57	0.004 8253	39.1	18.52	15.59	20.24	2.16	20 26 4.59
16	136	55 1 55.3	144.55	+0.62	0.004 9183	+38.4	18.65	+15.60	20.23	2.13	20 22 8.68
17	137	55 59 43.9	144.50	+0.63	0.005 0096	+37.6	18.79	+15.62	20.23	2.10	20 18 12.77



## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time, App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.		
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s
May 17	Th	3	34	39.57	9.917	+19	15	42.6	+34.07	15 50.48	8.70	+3 47.54	-0.060	3	38	27.11
18	Fr	3	38	37.87	9.941	19	29	10.5	32.26	15 50.28	8.70	3 45.80	0.084	3	42	23.67
19	Sa	3	42	36.74	9.964	19	42	18.6	32.42	15 50.09	8.70	3 43.49	0.108	3	46	20.22
20	Su	3	46	36.16	9.987	19	55	6.5	31.57	15 49.90	8.69	3 40.62	0.131	3	50	16.78
21	Mo	3	50	36.13	10.010	20	7	34.1	30.72	15 49.72	8.69	3 37.20	0.154	3	54	13.34
22	Tu	3	54	36.65	10.033	+20	19	41.0	+30.86	15 49.55	8.69	+3 33.25	-0.176	3	58	9.90
23	We	3	58	37.69	10.054	20	31	27.1	28.96	15 49.37	8.69	3 28.77	0.197	4	2	6.45
24	Th	4	2	39.23	10.075	20	42	52.0	28.09	15 49.21	8.69	3 23.78	0.218	4	6	3.01
25	Fr	4	6	41.28	10.096	20	53	55.5	27.20	15 49.04	8.69	3 18.29	0.239	4	9	59.57
26	Sa	4	10	43.81	10.115	21	4	37.4	26.29	15 48.88	8.69	3 12.32	0.259	4	13	56.12
27	Su	4	14	46.81	10.135	+21	14	57.5	+26.38	15 48.73	8.68	+3 5.87	-0.278	4	17	52.68
28	Mo	4	18	50.28	10.154	21	24	55.6	24.46	15 48.58	8.68	2 58.96	0.297	4	21	49.24
29	Tu	4	22	54.19	10.172	21	34	31.4	22.53	15 48.43	8.68	2 51.60	0.316	4	25	45.79
30	We	4	26	58.54	10.190	21	43	44.8	22.59	15 48.29	8.68	2 43.81	0.333	4	29	42.35
31	Th	4	31	3.30	10.207	21	52	35.6	21.64	15 48.15	8.68	2 35.61	0.350	4	33	38.91
June 1	Fr	4	35	8.47	10.223	+22	1	3.6	+20.69	15 48.01	8.68	+2 27.00	-0.367	4	37	35.47
2	Sa	4	39	14.02	10.239	22	9	8.6	19.73	15 47.88	8.68	2 18.00	0.383	4	41	32.02
3	Su	4	43	19.96	10.255	22	16	50.5	18.76	15 47.75	8.67	2 8.63	0.398	4	45	28.58
4	Mo	4	47	26.25	10.269	22	24	9.1	17.79	15 47.62	8.67	1 58.89	0.413	4	49	25.14
5	Tu	4	51	32.89	10.284	22	31	4.2	16.81	15 47.50	8.67	1 48.80	0.427	4	53	21.70
6	We	4	55	39.87	10.298	+22	37	35.8	+15.82	15 47.38	8.67	+1 38.38	-0.441	4	57	18.25
7	Th	4	59	47.18	10.311	22	43	43.6	14.83	15 47.26	8.67	1 27.64	0.454	5	1	14.81
8	Fr	5	3	54.79	10.323	22	49	27.5	13.83	15 47.14	8.67	1 16.59	0.467	5	5	11.37
9	Sa	5	8	2.69	10.335	22	54	47.4	12.83	15 47.03	8.67	1 5.24	0.479	5	9	7.93
10	Su	5	12	10.86	10.346	22	59	43.2	11.82	15 46.92	8.67	0 53.62	0.490	5	13	4.49
11	Mo	5	16	19.29	10.357	+23	4	14.7	+10.81	15 46.81	8.67	+0 41.75	-0.500	5	17	1.04
12	Tu	5	20	27.97	10.366	23	8	21.9	9.79	15 46.70	8.67	0 29.64	0.509	5	20	57.60
13	We	5	24	36.85	10.374	23	12	4.7	8.77	15 46.61	8.66	0 17.31	0.518	5	24	54.16
14	Th	5	28	45.93	10.382	23	15	22.8	7.74	15 46.51	8.66	+0 4.79	0.525	5	28	50.72
15	Fr	5	32	55.17	10.388	23	18	16.4	6.72	15 46.42	8.66	-0 7.89	0.532	5	32	47.28
16	Sa	5	37	4.55	10.393	+23	20	45.3	+5.69	15 46.34	8.66	-0 20.72	-0.537	5	36	43.83
17	Su	5	41	14.05	10.398	23	22	49.5	4.66	15 46.26	8.66	0 33.66	0.541	5	40	40.39
18	Mo	5	45	23.64	10.401	23	24	28.9	3.62	15 46.19	8.66	0 46.69	0.544	5	44	36.95
19	Tu	5	49	33.28	10.403	23	25	43.4	2.59	15 46.12	8.66	0 59.78	0.546	5	48	33.51
20	We	5	53	42.96	10.404	23	26	33.2	1.56	15 46.06	8.66	1 12.89	0.547	5	52	30.07
21	Th	5	57	52.64	10.403	+23	26	58.1	+0.52	15 46.00	8.66	-1 26.01	-0.546	5	56	26.62
22	Fr	6	2	2.29	10.401	23	26	58.3	-0.51	15 45.95	8.66	1 39.11	0.545	6	0	23.18
23	Sa	6	6	11.90	10.399	23	26	33.6	1.55	15 45.91	8.66	1 52.16	0.542	6	4	19.74
24	Su	6	10	21.42	10.395	23	25	44.1	2.58	15 45.87	8.66	2 5.13	0.538	6	8	16.30
25	Mo	6	14	30.85	10.390	23	24	29.9	3.61	15 45.83	8.66	2 17.99	0.533	6	12	12.86
26	Tu	6	18	40.15	10.384	+23	22	51.9	-4.63	15 45.80	8.66	-2 30.73	-0.528	6	16	9.41
27	We	6	22	49.29	10.377	23	20	47.5	5.66	15 45.77	8.66	2 43.32	0.521	6	20	5.97
28	Th	6	26	58.26	10.370	23	18	19.4	6.68	15 45.75	8.66	2 55.73	0.513	6	24	2.63
29	Fr	6	31	7.03	10.361	23	15	26.8	7.70	15 45.73	8.66	3 7.94	0.505	6	27	59.09
30	Sa	6	35	15.58	10.351	23	12	9.8	8.72	15 45.72	8.66	3 19.93	0.496	6	31	55.64
July 1	Su	6	39	23.88	10.341	+23	8	28.4	-9.73	15 45.71	8.66	-3 31.68	-0.484	6	35	52.20
2	Mo	6	43	31.93	10.330	+23	4	22.9	-10.73	15 45.71	8.66	-3 43.17	-0.473	6	39	48.76

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nat. in Long.	Aber. ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	" "	" "			" "	" "	" "	23° 27'	h m s
May 17	137	55 59 43.9	144.50	+0.63	0.005 0096	+37.6	18.79	+15.62	20.23	2.10	20 18 12.77
18	138	56 57 31.4	144.45	0.62	0.005 0989	36.8	18.93	15.64	20.23	2.08	20 14 16.86
19	139	57 55 17.6	144.40	0.58	0.005 1862	36.0	19.07	15.66	20.22	2.05	20 10 20.95
20	140	58 53 2.6	144.35	0.51	0.005 2715	35.1	19.20	15.68	20.22	2.02	20 6 25.04
21	141	59 50 46.3	144.29	0.42	0.005 3545	34.1	19.34	15.70	20.21	2.00	20 2 29.12
22	142	60 48 28.6	144.24	+0.30	0.005 4354	+33.3	19.48	+15.73	20.21	1.97	19 58 33.21
23	143	61 46 9.6	144.18	0.17	0.005 5142	32.4	19.62	15.75	20.21	1.95	19 54 37.30
24	144	62 43 49.2	144.12	+0.05	0.005 5909	31.5	19.76	15.78	20.20	1.92	19 50 41.39
25	145	63 41 27.3	144.06	-0.08	0.005 6655	30.7	19.89	15.80	20.20	1.90	19 46 45.48
26	146	64 39 4.0	144.00	0.20	0.005 7382	29.9	20.03	15.83	20.20	1.87	19 42 49.57
27	147	65 36 39.4	143.94	-0.31	0.005 8090	+29.1	20.17	+15.86	20.19	1.85	19 38 53.66
28	148	66 34 13.3	143.89	0.40	0.005 8779	28.3	20.31	15.89	20.19	1.83	19 34 57.75
29	149	67 31 45.9	143.83	0.46	0.005 9451	27.6	20.44	15.92	20.19	1.81	19 31 1.84
30	150	68 29 17.1	143.77	0.51	0.006 0106	26.9	20.58	15.95	20.18	1.78	19 27 5.92
31	151	69 26 47.0	143.72	0.53	0.006 0745	26.3	20.72	15.99	20.18	1.76	19 23 10.01
June 1	152	70 24 15.6	143.67	-0.51	0.006 1369	+25.7	20.86	+16.02	20.18	1.74	19 19 14.10
2	153	71 21 43.0	143.62	0.47	0.006 1979	25.1	20.99	16.05	20.17	1.72	19 15 18.19
3	154	72 19 9.2	143.57	0.40	0.006 2576	24.6	21.13	16.09	20.17	1.70	19 11 22.28
4	155	73 16 34.3	143.53	0.30	0.006 3160	24.1	21.27	16.13	20.17	1.68	19 7 26.37
5	156	74 13 58.4	143.49	0.19	0.006 3732	23.6	21.41	16.16	20.17	1.66	19 3 30.45
6	157	75 11 21.6	143.45	-0.06	0.006 4292	+23.1	21.54	+16.20	20.16	1.64	18 59 34.54
7	158	76 8 44.0	143.42	+0.07	0.006 4841	22.6	21.68	16.24	20.16	1.62	18 55 38.63
8	159	77 6 5.8	143.39	0.21	0.006 5376	22.0	21.82	16.28	20.16	1.60	18 51 42.72
9	160	78 3 26.9	143.37	0.34	0.006 5898	21.4	21.96	16.32	20.16	1.59	18 47 46.81
10	161	79 0 47.5	143.35	0.46	0.006 6404	20.8	22.09	16.36	20.15	1.57	18 43 50.89
11	162	79 58 7.6	143.33	+0.55	0.006 6894	+20.1	22.23	+16.40	20.15	1.55	18 39 54.98
12	163	80 55 27.4	143.31	0.61	0.006 7367	19.3	22.37	16.44	20.15	1.54	18 35 59.07
13	164	81 52 46.7	143.30	0.64	0.006 7819	18.4	22.51	16.48	20.15	1.52	18 32 3.16
14	165	82 50 5.7	143.28	0.63	0.006 8251	17.5	22.65	16.52	20.15	1.51	18 28 7.25
15	166	83 47 24.3	143.27	0.59	0.006 8660	16.6	22.78	16.56	20.14	1.50	18 24 11.33
16	167	84 44 42.6	143.25	+0.52	0.006 9046	+15.6	22.92	+16.60	20.14	1.48	18 20 15.42
17	168	85 42 0.4	143.24	0.43	0.006 9407	14.5	23.06	16.65	20.14	1.47	18 16 19.51
18	169	86 39 17.9	143.22	0.32	0.006 9743	13.5	23.20	16.69	20.14	1.46	18 12 23.60
19	170	87 36 34.9	143.20	0.20	0.007 0054	12.4	23.33	16.73	20.14	1.44	18 8 27.69
20	171	88 33 51.4	143.18	+0.07	0.007 0338	11.3	23.47	16.77	20.14	1.43	18 4 31.77
21	172	89 31 7.5	143.16	-0.06	0.007 0598	+10.3	23.61	+16.82	20.13	1.42	18 0 35.86
22	173	90 28 23.0	143.14	0.18	0.007 0832	9.2	23.75	16.86	20.13	1.41	17 56 39.95
23	174	91 25 38.0	143.11	0.31	0.007 1042	8.2	23.88	16.90	20.13	1.40	17 52 44.04
24	175	92 22 52.5	143.09	0.41	0.007 1228	7.3	24.02	16.94	20.13	1.40	17 48 48.13
25	176	93 20 6.5	143.07	0.48	0.007 1391	6.3	24.16	16.99	20.13	1.39	17 44 52.21
26	177	94 17 20.0	143.05	-0.53	0.007 1531	+ 5.4	24.30	+17.03	20.13	1.38	17 40 56.30
27	178	95 14 32.9	143.03	0.56	0.007 1650	4.5	24.43	17.07	20.13	1.37	17 37 0.39
28	179	96 11 45.4	143.01	0.56	0.007 1748	3.7	24.57	17.11	20.13	1.37	17 33 4.48
29	180	97 8 57.4	142.99	0.53	0.007 1827	2.9	24.71	17.15	20.13	1.36	17 29 8.57
30	181	98 6 9.1	142.98	0.48	0.007 1887	2.1	24.85	17.20	20.13	1.36	17 25 12.65
July 1	182	99 3 20.3	142.96	-0.39	0.007 1930	+ 1.4	24.98	+17.24	20.13	1.35	17 21 16.74
2	183	100 0 31.3	142.95	-0.28	0.007 1956	+ 0.8	25.12	+17.28	20.13	1.35	17 17 20.83

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.		
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s
July	1 Su	6	39	23.88	10.341	+23	8	28.4	-9.73	15 45.71	8.66	-3 31.68	-0.484	6	35	52.20
	2 Mo	6	43	31.93	10.330	23	4	22.9	10.73	15 45.71	8.66	3 43.17	0.473	6	39	48.76
	3 Tu	6	47	39.69	10.317	22	59	53.2	11.74	15 45.70	8.66	3 54.37	0.461	6	43	45.32
	4 We	6	51	47.16	10.305	22	54	59.4	12.74	15 45.70	8.66	4 5.28	0.448	6	47	41.88
	5 Th	6	55	54.32	10.292	22	49	41.7	13.73	15 45.71	8.66	4 15.88	0.435	6	51	38.43
	6 Fr	7	0	1.15	10.278	+22	44	0.2	-14.72	15 45.71	8.66	-4 26.16	-0.421	6	55	34.99
	7 Sa	7	4	7.64	10.263	22	37	55.1	15.71	15 45.72	8.66	4 36.09	0.407	6	59	31.55
	8 Su	7	8	13.78	10.248	22	31	26.3	16.69	15 45.74	8.66	4 45.67	0.392	7	3	28.11
	9 Mo	7	12	19.55	10.233	22	24	34.2	17.66	15 45.75	8.66	4 54.89	0.376	7	7	24.66
	10 Tu	7	16	24.94	10.216	22	17	18.8	18.63	15 45.77	8.66	5 3.72	0.360	7	11	21.22
	11 We	7	20	29.92	10.199	+22	9	40.2	-19.59	15 45.80	8.66	-5 12.15	-0.343	7	15	17.78
	12 Th	7	24	34.49	10.182	22	1	38.7	20.54	15 45.83	8.66	5 20.16	0.325	7	19	14.34
	13 Fr	7	28	38.63	10.163	21	53	14.5	21.48	15 45.86	8.66	5 27.74	0.306	7	23	10.89
	14 Sa	7	32	42.32	10.144	21	44	27.7	22.42	15 45.90	8.66	5 34.87	0.287	7	27	7.45
	15 Su	7	36	45.54	10.124	21	35	18.6	23.34	15 45.94	8.66	5 41.53	0.268	7	31	4.01
	16 Mo	7	40	48.28	10.104	+21	25	47.3	-24.26	15 45.99	8.66	-5 47.71	-0.247	7	35	0.57
	17 Tu	7	44	50.52	10.083	21	15	54.1	25.17	15 46.04	8.66	5 53.39	0.226	7	38	57.12
	18 We	7	48	52.24	10.061	21	5	39.2	26.07	15 46.11	8.66	5 58.56	0.204	7	42	53.68
	19 Th	7	52	53.43	10.038	20	55	2.9	26.96	15 46.17	8.66	6 3.19	0.182	7	46	50.24
	20 Fr	7	56	54.07	10.015	20	44	5.4	27.83	15 46.24	8.66	6 7.28	0.159	7	50	46.79
	21 Sa	8	0	54.16	9.992	+20	32	47.0	-28.70	15 46.32	8.66	-6 10.81	-0.136	7	54	43.35
	22 Su	8	4	53.68	9.968	20	21	7.8	29.56	15 46.40	8.66	6 13.78	0.112	7	58	39.91
	23 Mo	8	8	52.62	9.944	20	9	8.3	30.40	15 46.49	8.66	6 16.16	0.087	8	2	36.46
	24 Tu	8	12	50.97	9.919	19	56	48.5	31.24	15 46.58	8.66	6 17.95	0.063	8	6	33.02
	25 We	8	16	48.73	9.894	19	44	8.9	32.06	15 46.68	8.66	6 19.15	0.037	8	10	29.58
	26 Th	8	20	45.88	9.868	+19	31	9.7	-32.87	15 46.78	8.66	-6 19.74	-0.012	8	14	26.13
	27 Fr	8	24	42.41	9.843	19	17	51.2	33.67	15 46.88	8.67	6 19.72	+0.014	8	18	22.69
	28 Sa	8	28	38.33	9.817	19	4	13.5	34.46	15 46.99	8.67	6 19.08	0.039	8	22	19.25
	29 Su	8	32	33.63	9.791	18	50	17.1	35.24	15 47.11	8.67	6 17.83	0.065	8	26	15.80
	30 Mo	8	36	28.31	9.765	18	36	2.2	36.00	15 47.22	8.67	6 15.95	0.091	8	30	12.36
	31 Tu	8	40	22.37	9.740	+18	21	29.0	-36.76	15 47.34	8.67	-6 13.45	+0.117	8	34	8.92
Aug.	1 We	8	44	15.81	9.714	18	6	37.8	37.50	15 47.47	8.67	6 10.34	0.143	8	38	5.47
	2 Th	8	48	8.64	9.689	17	51	28.9	38.24	15 47.59	8.67	6 6.61	0.168	8	42	2.03
	3 Fr	8	52	0.86	9.663	17	36	2.5	38.96	15 47.72	8.67	6 2.27	0.193	8	45	58.58
	4 Sa	8	55	52.47	9.638	17	20	19.0	39.67	15 47.85	8.68	5 57.33	0.218	8	49	55.14
	5 Su	8	59	43.49	9.614	+17	4	18.5	-40.37	15 47.99	8.68	-5 51.80	+0.243	8	53	51.70
	6 Mo	9	3	33.93	9.589	16	48	1.4	41.06	15 48.12	8.68	5 45.68	0.267	8	57	48.25
	7 Tu	9	7	23.78	9.565	16	31	27.9	41.73	15 48.26	8.68	5 38.98	0.291	9	1	44.81
	8 We	9	11	13.06	9.542	16	14	38.3	42.40	15 48.41	8.68	5 31.70	0.315	9	5	41.36
	9 Th	9	15	1.78	9.518	15	57	32.9	43.05	15 48.55	8.68	5 23.86	0.338	9	9	37.92
	10 Fr	9	18	49.93	9.495	+15	40	12.0	-43.69	15 48.70	8.68	-5 15.46	+0.362	9	13	34.47
	11 Sa	9	22	37.53	9.472	15	22	35.9	44.32	15 48.85	8.68	5 6.50	0.385	9	17	31.03
	12 Su	9	26	24.58	9.449	15	4	44.9	44.93	15 49.01	8.68	4 56.99	0.408	9	21	27.58
	13 Mo	9	30	11.08	9.426	14	46	39.4	45.53	15 49.17	8.69	4 46.94	0.430	9	25	24.14
	14 Tu	9	33	57.04	9.404	14	28	19.7	46.11	15 49.34	8.69	4 36.35	0.453	9	29	20.69
	15 We	9	37	42.47	9.382	+14	9	46.1	-46.68	15 49.51	8.69	-4 25.22	+0.475	9	33	17.25
	16 Th	9	41	27.37	9.360	+13	50	58.9	-47.24	15 49.68	8.69	-4 13.57	+0.496	9	37	13.80

## FOR GREENWICH MEAN NOON

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberation.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	"	"			"	"	"	23° 57'	h m s
July	1	182 99 3 20.3	142.96	-0.39	0.007 1930	+ 1.4	24.98	+17.24	20.13	1.35	17 21 16.74
	2	183 100 0 31.3	142.96	0.28	0.007 1956	0.8	25.12	17.28	20.13	1.35	17 17 20.83
	3	184 100 57 42.0	142.96	0.15	0.007 1968	+ 0.2	25.26	17.32	20.13	1.35	17 13 24.92
	4	185 101 54 52.6	142.94	-0.02	0.007 1965	- 0.4	25.40	17.36	20.13	1.34	17 9 29.01
	5	186 102 52 3.2	142.94	+0.12	0.007 1949	1.0	25.53	17.40	20.13	1.34	17 5 33.09
	6	187 103 49 13.9	142.96	+0.26	0.007 1919	- 1.6	25.67	+17.43	20.13	1.34	17 1 37.18
	7	188 104 46 24.8	142.96	0.38	0.007 1874	2.2	25.81	17.47	20.13	1.34	16 57 41.27
	8	189 105 43 36.0	142.97	0.48	0.007 1814	2.8	25.95	17.51	20.13	1.34	16 53 45.36
	9	190 106 40 47.6	142.99	0.55	0.007 1739	3.5	26.09	17.54	20.13	1.34	16 49 49.45
	10	191 107 37 59.6	143.01	0.59	0.007 1646	4.3	26.22	17.58	20.13	1.34	16 45 53.54
	11	192 108 35 12.2	143.03	+0.60	0.007 1534	- 5.1	26.36	+17.62	20.13	1.34	16 41 57.63
	12	193 109 32 25.3	143.06	0.57	0.007 1402	5.9	26.50	17.65	20.13	1.34	16 38 1.71
	13	194 110 29 38.9	143.08	0.52	0.007 1248	6.9	26.64	17.68	20.13	1.34	16 34 5.80
	14	195 111 26 53.1	143.10	0.43	0.007 1071	7.9	26.77	17.71	20.13	1.34	16 30 9.89
	15	196 112 24 7.9	143.13	0.33	0.007 0871	8.9	26.91	17.75	20.13	1.34	16 26 13.98
	16	197 113 21 23.2	143.15	+0.20	0.007 0646	- 9.9	27.05	+17.78	20.13	1.35	16 22 18.07
	17	198 114 18 39.1	143.17	+0.06	0.007 0396	10.9	27.19	17.80	20.14	1.35	16 18 22.16
	18	199 115 15 55.4	143.19	-0.07	0.007 0121	12.0	27.32	17.83	20.14	1.36	16 14 26.25
	19	200 116 13 12.3	143.21	0.20	0.006 9820	13.0	27.46	17.86	20.14	1.36	16 10 30.34
	20	201 117 10 29.6	143.23	0.32	0.006 9495	14.1	27.60	17.89	20.14	1.37	16 6 34.42
	21	202 118 7 47.4	143.25	-0.42	0.006 9144	-15.1	27.74	+17.91	20.14	1.37	16 2 38.51
	22	203 119 5 5.6	143.27	0.50	0.006 8769	16.1	27.87	17.94	20.14	1.37	15 58 42.60
	23	204 120 2 24.2	143.29	0.56	0.006 8370	17.1	28.01	17.96	20.14	1.38	15 54 46.69
	24	205 120 59 43.3	143.30	0.61	0.006 7948	18.0	28.15	17.98	20.15	1.39	15 50 50.78
	25	206 121 57 2.8	143.32	0.62	0.006 7504	18.9	28.29	18.00	20.15	1.39	15 46 54.87
	26	207 122 54 22.7	143.34	-0.61	0.006 7039	-19.8	28.42	+18.02	20.15	1.40	15 42 58.96
	27	208 123 51 43.1	143.36	0.55	0.006 6554	20.6	28.56	18.04	20.15	1.41	15 39 3.05
	28	209 124 49 3.9	143.38	0.48	0.006 6049	21.4	28.70	18.05	20.16	1.41	15 35 7.14
	29	210 125 46 25.3	143.40	0.37	0.006 5527	22.1	28.84	18.07	20.16	1.42	15 31 11.23
	30	211 126 43 47.1	143.42	0.25	0.006 4989	22.7	28.98	18.08	20.16	1.43	15 27 15.32
	31	212 127 41 9.6	143.45	-0.13	0.006 4436	-23.3	29.11	+18.10	20.16	1.44	15 23 19.41
Aug.	1	213 128 38 32.7	143.48	+0.01	0.006 3870	23.8	29.25	18.11	20.17	1.44	15 19 23.50
	2	214 129 35 56.5	143.51	0.15	0.006 3292	24.3	29.39	18.12	20.17	1.45	15 15 27.59
	3	215 130 33 21.3	143.55	0.26	0.006 2702	24.8	29.53	18.12	20.17	1.46	15 11 31.68
	4	216 131 30 47.0	143.59	0.36	0.006 2101	25.3	29.66	18.13	20.17	1.47	15 7 35.77
	5	217 132 28 13.7	143.64	+0.44	0.006 1488	-25.8	29.80	+18.14	20.18	1.48	15 3 39.86
	6	218 133 25 41.7	143.69	0.49	0.006 0864	26.3	29.94	18.14	20.18	1.48	14 59 43.95
	7	219 134 23 10.9	143.75	0.51	0.006 0227	26.9	30.08	18.15	20.18	1.49	14 55 48.04
	8	220 135 20 41.5	143.80	0.49	0.005 9575	27.5	30.21	18.15	20.19	1.50	14 51 52.13
	9	221 136 18 13.4	143.86	0.44	0.005 8908	28.1	30.35	18.15	20.19	1.51	14 47 56.22
	10	222 137 15 46.8	143.92	+0.36	0.005 8224	-28.8	30.49	+18.15	20.19	1.52	14 44 0.31
	11	223 138 13 21.6	143.98	0.26	0.005 7523	29.6	30.63	18.15	20.20	1.53	14 40 4.40
	12	224 139 10 57.8	144.04	0.14	0.005 6802	30.4	30.76	18.14	20.20	1.53	14 36 8.49
	13	225 140 8 35.5	144.10	+0.01	0.005 6062	31.2	30.90	18.14	20.20	1.54	14 32 12.58
	14	226 141 6 14.6	144.16	-0.11	0.005 5302	32.1	31.04	18.13	20.21	1.55	14 28 16.67
	15	227 142 3 55.1	144.21	-0.23	0.005 4522	-33.0	31.18	+18.12	20.21	1.56	14 24 20.76
	16	228 143 1 37.0	144.27	-0.35	0.005 3720	-33.9	31.31	+18.11	20.21	1.57	14 20 24.85

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Aug. 16	Th	9 41 27.37	9.360	+13 50 58.9	-47.24	15 49.68	8.69	- 4 13.57	+0.496	9 37 13.80
17	Fr	9 45 11.76	9.339	13 31 58.5	47.79	15 49.86	8.69	4 1.40	0.518	9 41 10.36
18	Sa	9 48 55.63	9.317	13 12 45.2	48.32	15 50.05	8.70	3 48.72	0.539	9 45 6.91
19	Su	9 52 38.99	9.296	12 53 19.4	48.83	15 50.24	8.70	3 35.53	0.560	9 49 3.47
20	Mo	9 56 21.86	9.276	12 33 41.3	49.34	15 50.43	8.70	3 21.84	0.580	9 53 0.02
21	Tu	10 0 4.24	9.256	+12 13 51.3	-49.83	15 50.63	8.70	- 3 7.67	+0.600	9 56 56.58
22	We	10 3 46.15	9.236	11 53 49.8	50.30	15 50.83	8.70	2 53.02	0.620	10 0 53.13
23	Th	10 7 27.59	9.217	11 33 37.0	50.78	15 51.04	8.70	2 37.90	0.639	10 4 49.68
24	Fr	10 11 8.57	9.196	11 13 13.4	51.20	15 51.24	8.70	2 22.33	0.658	10 8 46.24
25	Sa	10 14 49.11	9.180	10 52 39.3	51.64	15 51.46	8.71	2 6.32	0.676	10 12 42.79
26	Su	10 18 29.22	9.162	+10 31 54.8	-52.06	15 51.67	8.71	- 1 49.87	+0.694	10 16 39.35
27	Mo	10 22 8.91	9.145	10 11 0.5	52.47	15 51.89	8.71	1 33.01	0.711	10 20 35.90
28	Tu	10 25 48.20	9.129	9 49 56.5	52.86	15 52.11	8.71	1 18.75	0.727	10 24 32.45
29	We	10 29 27.11	9.114	9 28 43.3	53.24	15 52.34	8.72	0 58.11	0.743	10 28 29.01
30	Th	10 33 5.66	9.099	9 7 21.1	53.61	15 52.56	8.72	0 40.10	0.758	10 32 25.56
31	Fr	10 36 43.86	9.085	+ 8 45 50.2	-53.97	15 52.79	8.72	- 0 21.74	+0.772	10 36 22.12
Sept. 1	Sa	10 40 21.73	9.072	8 24 10.8	54.31	15 53.01	8.72	- 0 3.06	0.785	10 40 18.67
2	Su	10 43 59.30	9.059	8 2 23.3	54.64	15 53.24	8.73	+ 0 15.92	0.797	10 44 15.22
3	Mo	10 47 36.59	9.048	7 40 28.0	54.96	15 53.47	8.73	0 35.19	0.808	10 48 11.78
4	Tu	10 51 13.62	9.038	7 18 25.2	55.27	15 53.70	8.73	0 54.71	0.818	10 52 8.33
5	We	10 54 50.41	9.028	+ 6 56 15.1	-55.57	15 53.94	8.73	+ 1 14.47	+0.828	10 56 4.88
6	Th	10 58 26.98	9.020	6 33 58.1	55.85	15 54.17	8.73	1 34.45	0.837	11 0 1.44
7	Fr	11 2 3.36	9.012	6 11 34.4	56.12	15 54.41	8.74	1 54.63	0.845	11 3 57.99
8	Sa	11 5 39.56	9.005	5 49 4.5	56.37	15 54.64	8.74	2 14.98	0.852	11 7 54.54
9	Su	11 9 15.60	8.998	5 26 28.7	56.61	15 54.88	8.74	2 35.50	0.858	11 11 51.09
10	Mo	11 12 51.49	8.993	+ 5 3 47.2	-56.84	15 55.13	8.74	+ 2 56.16	+0.863	11 15 47.65
11	Tu	11 16 27.26	8.988	4 41 0.4	57.05	15 55.37	8.74	3 16.94	0.868	11 19 44.20
12	We	11 20 2.92	8.984	4 18 8.7	57.25	15 55.62	8.75	3 37.83	0.873	11 23 40.75
13	Th	11 23 38.49	8.981	3 55 12.5	57.43	15 55.87	8.75	3 58.82	0.876	11 27 37.31
14	Fr	11 27 13.99	8.978	3 32 12.0	57.60	15 56.12	8.75	4 19.87	0.879	11 31 33.86
15	Sa	11 30 49.43	8.976	+ 3 9 7.7	-57.76	15 56.38	8.75	+ 4 40.99	+0.881	11 35 30.41
16	Su	11 34 24.83	8.974	2 45 59.8	57.90	15 56.63	8.76	5 2.14	0.883	11 39 26.97
17	Mo	11 38 0.20	8.974	2 22 48.7	58.02	15 56.90	8.76	5 23.32	0.883	11 43 23.52
18	Tu	11 41 35.57	8.974	1 59 34.8	58.13	15 57.16	8.76	5 44.50	0.882	11 47 20.07
19	We	11 45 10.96	8.975	1 36 18.5	58.23	15 57.43	8.76	6 5.67	0.881	11 51 16.62
20	Th	11 48 46.37	8.976	+ 1 13 0.0	-58.31	15 57.70	8.77	+ 6 26.80	+0.880	11 55 13.18
21	Fr	11 52 21.83	8.979	0 49 39.8	58.37	15 57.97	8.77	6 47.90	0.878	11 59 9.73
22	Sa	11 55 57.35	8.982	0 26 18.3	58.42	15 58.24	8.77	7 8.93	0.875	12 3 6.28
23	Su	11 59 32.96	8.986	+ 0 2 55.6	58.46	15 58.52	8.77	7 29.88	0.871	12 7 2.84
24	Mo	12 3 8.67	8.990	- 0 20 27.8	58.48	15 58.80	8.78	7 50.72	0.866	12 10 59.39
25	Tu	12 6 44.50	8.996	- 0 43 51.5	-58.49	15 59.07	8.78	+ 8 11.45	+0.861	12 14 55.94
26	We	12 10 20.47	9.002	1 7 15.3	58.49	15 59.35	8.78	8 32.03	0.854	12 18 52.50
27	Th	12 13 56.60	9.009	1 30 38.7	58.47	15 59.63	8.78	8 52.45	0.847	12 22 49.05
28	Fr	12 17 32.91	9.017	1 54 1.6	58.44	15 59.91	8.79	9 12.69	0.839	12 26 45.60
29	Sa	12 21 9.44	9.027	2 17 23.5	58.39	16 0.18	8.79	9 32.71	0.830	12 30 42.15
30	Su	12 24 46.20	9.037	- 2 40 44.1	-58.33	16 0.46	8.79	+ 9 52.50	+0.820	12 34 38.71
Oct. 1	Mo	12 28 23.22	9.048	- 3 4 3.2	-58.26	16 0.74	8.79	+10 12.04	+0.808	12 38 35.23

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Pres. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		" ' "	"	"			"	"	"	23° 27'	h m s
Aug. 16	228	143 1 37.0	144.27	-0.35	0.005 3720	-33.9	31.31	+18.11	20.21	1.57	14 20 24.85
17	229	143 59 20.2	144.33	0.46	0.005 2897	34.7	31.45	18.10	20.22	1.58	14 16 28.94
18	230	144 57 4.8	144.39	0.55	0.005 2054	35.6	31.59	18.09	20.22	1.58	14 12 33.03
19	231	145 54 50.7	144.44	0.62	0.005 1190	36.4	31.73	18.08	20.22	1.59	14 8 37.13
20	232	146 52 37.9	144.49	0.66	0.005 0307	37.3	31.86	18.06	20.23	1.60	14 4 41.22
21	233	147 50 26.4	144.55	-0.67	0.004 9404	-38.0	32.00	+18.05	20.23	1.61	14 0 45.31
22	234	148 48 16.1	144.60	0.66	0.004 8482	38.8	32.14	18.03	20.24	1.61	13 56 49.40
23	235	149 46 7.1	144.65	0.62	0.004 7543	39.5	32.28	18.01	20.24	1.62	13 52 53.49
24	236	150 43 59.3	144.70	0.56	0.004 6586	40.3	32.42	17.99	20.25	1.63	13 48 57.58
25	237	151 41 52.7	144.75	0.46	0.004 5615	40.8	32.55	17.97	20.25	1.63	13 45 1.68
26	238	152 39 47.4	144.80	-0.35	0.004 4629	-41.3	32.69	+17.95	20.26	1.64	13 41 5.77
27	239	153 37 43.3	144.86	0.22	0.004 3631	41.8	32.83	17.92	20.26	1.64	13 37 9.86
28	240	154 35 40.5	144.91	-0.10	0.004 2622	42.3	32.97	17.90	20.26	1.65	13 33 13.95
29	241	155 33 39.0	144.97	+0.04	0.004 1604	42.6	33.10	17.87	20.27	1.65	13 29 18.04
30	242	156 31 38.9	145.03	0.16	0.004 0579	42.9	33.24	17.85	20.27	1.66	13 25 22.14
31	243	157 29 40.3	145.09	+0.27	0.003 9547	-43.1	33.38	+17.82	20.28	1.66	13 21 26.23
Sept. 1	244	158 27 43.2	145.16	0.35	0.003 8509	43.3	33.52	17.79	20.28	1.66	13 17 30.32
2	245	159 25 47.8	145.23	0.40	0.003 7467	43.5	33.65	17.76	20.29	1.67	13 13 34.41
3	246	160 23 54.2	145.30	0.42	0.003 6421	43.7	33.79	17.73	20.29	1.67	13 9 38.51
4	247	161 22 2.5	145.38	0.42	0.003 5369	44.0	33.93	17.70	20.30	1.67	13 5 42.60
5	248	162 20 12.6	145.47	+0.37	0.003 4311	-44.2	34.07	+17.66	20.30	1.67	13 1 46.69
6	249	163 18 24.8	145.55	0.30	0.003 3247	44.5	34.20	17.63	20.31	1.67	12 57 50.78
7	250	164 16 39.0	145.63	0.20	0.003 2175	44.9	34.34	17.60	20.31	1.67	12 53 54.88
8	251	165 14 55.3	145.73	+0.09	0.003 1093	45.3	34.48	17.56	20.32	1.67	12 49 58.97
9	252	166 13 13.6	145.81	-0.08	0.003 0002	45.7	34.62	17.52	20.32	1.67	12 46 3.06
10	253	167 11 34.1	145.89	-0.16	0.002 8900	-46.1	34.75	+17.49	20.33	1.67	12 42 7.16
11	254	168 9 56.6	145.98	0.28	0.002 7787	46.6	34.89	17.45	20.33	1.67	12 38 11.25
12	255	169 8 21.1	146.07	0.41	0.002 6662	47.1	35.03	17.41	20.34	1.67	12 34 15.34
13	256	170 6 47.7	146.15	0.51	0.002 5524	47.7	35.17	17.37	20.34	1.67	12 30 19.44
14	257	171 5 16.3	146.23	0.60	0.002 4374	48.2	35.30	17.33	20.35	1.66	12 26 23.53
15	258	172 3 46.9	146.31	-0.66	0.002 3211	-48.7	35.44	+17.30	20.36	1.66	12 22 27.62
16	259	173 2 19.4	146.39	0.70	0.002 2035	49.3	35.58	17.26	20.36	1.65	12 18 31.71
17	260	174 0 53.8	146.47	0.73	0.002 0847	49.8	35.72	17.22	20.37	1.65	12 14 35.81
18	261	174 59 30.1	146.55	0.73	0.001 9647	50.3	35.86	17.17	20.37	1.64	12 10 39.90
19	262	175 58 8.3	146.63	0.70	0.001 8435	50.7	35.99	17.13	20.38	1.63	12 6 43.99
20	263	176 56 48.2	146.70	-0.63	0.001 7213	-51.1	36.13	+17.09	20.38	1.63	12 2 48.09
21	264	177 55 29.9	146.77	0.54	0.001 5982	51.5	36.27	17.05	20.39	1.62	11 58 52.18
22	265	178 54 13.3	146.84	0.44	0.001 4741	51.8	36.41	17.01	20.39	1.61	11 54 56.27
23	266	179 52 58.4	146.91	0.32	0.001 3494	52.1	36.54	16.97	20.40	1.60	11 51 0.37
24	267	180 51 45.3	146.99	0.18	0.001 2241	52.3	36.68	16.93	20.41	1.59	11 47 4.46
25	268	181 50 33.8	147.06	-0.05	0.001 0984	-52.4	36.82	+16.88	20.41	1.58	11 43 8.55
26	269	182 49 24.0	147.13	+0.07	0.000 9724	52.5	36.96	16.84	20.42	1.57	11 39 12.64
27	270	183 48 16.0	147.20	0.18	0.000 8465	52.5	37.09	16.80	20.42	1.56	11 35 16.74
28	271	184 47 9.7	147.28	0.26	0.000 7206	52.4	37.23	16.76	20.43	1.55	11 31 20.83
29	272	185 46 5.2	147.35	0.31	0.000 5951	52.2	37.37	16.72	20.44	1.54	11 27 24.92
30	273	186 45 2.7	147.44	+0.34	0.000 4700	-52.1	37.51	+16.68	20.44	1.52	11 23 29.02
Oct. 1	274	187 44 2.2	147.52	+0.33	0.000 3453	-51.9	37.64	+16.64	20.45	1.51	11 19 33.11

## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time, App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ' "	"	' "	"	m s	s	h m s
Oct. 1	Mo	12 28 23.22	9.048	- 3 4 3.2	-58.26	16 0.74	8.79	+10 12.04	+0.808	12 38 35.26
2	Tu	12 32 0.53	9.061	3 27 20.4	58.17	16 1.01	8.80	10 31.28	0.796	12 42 31.81
3	We	12 35 38.14	9.074	3 50 35.3	58.07	16 1.29	8.80	10 50.22	0.782	12 46 28.36
4	Th	12 39 16.09	9.089	4 13 47.7	57.96	16 1.56	8.80	11 8.82	0.768	12 50 24.92
5	Fr	12 42 54.40	9.104	4 36 57.2	57.83	16 1.83	8.80	11 27.07	0.753	12 54 21.47
6	Sa	12 46 33.09	9.120	- 5 0 3.5	-57.69	16 2.10	8.81	+11 44.94	+0.736	12 58 18.02
7	Su	12 50 12.17	9.137	5 23 6.1	57.53	16 2.37	8.81	12 2.40	0.719	13 2 14.58
8	Mo	12 53 51.68	9.155	5 46 4.7	57.35	16 2.64	8.81	12 19.45	0.701	13 6 11.13
9	Tu	12 57 31.63	9.174	6 8 58.9	57.16	16 2.92	8.81	12 36.06	0.682	13 10 7.68
10	We	13 1 12.03	9.193	6 31 48.3	56.96	16 3.19	8.82	12 52.20	0.663	13 14 4.24
11	Th	13 4 52.91	9.214	- 6 54 32.7	-56.74	16 3.46	8.82	+13 7.87	+0.643	13 18 0.79
12	Fr	13 8 34.29	9.235	7 17 11.5	56.49	16 3.73	8.82	13 23.05	0.622	13 21 57.34
13	Sa	13 12 16.18	9.256	7 39 44.3	56.24	16 4.00	8.82	13 37.72	0.600	13 25 53.90
14	Su	13 15 58.59	9.278	8 2 10.9	55.97	16 4.28	8.83	13 51.86	0.578	13 29 50.45
15	Mo	13 19 41.54	9.301	8 24 30.7	55.68	16 4.55	8.83	14 5.46	0.555	13 33 47.00
16	Tu	13 23 25.06	9.325	- 8 46 43.5	-55.38	16 4.82	8.83	+14 18.50	+0.531	13 37 43.56
17	We	13 27 9.15	9.349	9 8 48.7	55.06	16 5.10	8.83	14 30.96	0.507	13 41 40.11
18	Th	13 30 53.82	9.374	9 30 46.0	54.73	16 5.37	8.84	14 42.85	0.483	13 45 36.66
19	Fr	13 34 39.09	9.399	9 52 34.9	54.36	16 5.65	8.84	14 54.13	0.457	13 49 33.22
20	Sa	13 38 24.97	9.425	10 14 15.1	53.99	16 5.92	8.84	15 4.80	0.432	13 53 29.77
21	Su	13 42 11.48	9.451	-10 35 46.3	-53.60	16 6.20	8.84	+15 14.84	+0.405	13 57 26.32
22	Mo	13 45 58.63	9.478	10 57 7.9	53.19	16 6.47	8.85	15 24.25	0.379	14 1 22.88
23	Tu	13 49 46.43	9.505	11 18 19.5	52.77	16 6.75	8.85	15 33.01	0.351	14 5 19.43
24	We	13 53 34.89	9.533	11 39 20.8	52.33	16 7.02	8.85	15 41.09	0.323	14 9 15.99
25	Th	13 57 24.04	9.562	12 0 11.5	51.88	16 7.29	8.85	15 48.50	0.295	14 13 12.54
26	Fr	14 1 13.88	9.591	-12 20 51.1	-51.41	16 7.56	8.86	+15 55.22	+0.265	14 17 9.10
27	Sa	14 5 4.43	9.621	12 41 19.2	50.93	16 7.82	8.86	16 1.22	0.235	14 21 5.65
28	Su	14 8 55.71	9.652	13 1 35.4	50.43	16 8.09	8.86	16 6.49	0.204	14 25 2.20
29	Mo	14 12 47.73	9.683	13 21 39.5	49.91	16 8.35	8.86	16 11.03	0.173	14 28 58.76
30	Tu	14 16 40.51	9.715	13 41 30.9	49.37	16 8.60	8.87	16 14.80	0.141	14 32 55.31
31	We	14 20 34.07	9.748	-14 1 9.3	-48.83	16 8.86	8.87	+16 17.80	+0.108	14 36 51.87
Nov. 1	Th	14 24 28.42	9.781	14 20 34.4	48.26	16 9.11	8.87	16 20.00	0.075	14 40 48.42
2	Fr	14 28 23.57	9.815	14 39 45.7	47.68	16 9.35	8.87	16 21.40	0.042	14 44 44.98
3	Sa	14 32 19.54	9.849	14 58 42.9	47.08	16 9.59	8.87	16 21.99	+0.007	14 48 41.53
4	Su	14 36 16.34	9.884	15 17 25.4	46.46	16 9.83	8.88	16 21.75	-0.028	14 52 38.09
5	Mo	14 40 13.98	9.919	-15 35 53.0	-45.83	16 10.07	8.88	+16 20.66	-0.063	14 56 34.64
6	Tu	14 44 12.47	9.955	15 54 5.2	45.18	16 10.30	8.88	16 18.73	0.098	15 0 31.20
7	We	14 48 11.80	9.990	16 12 1.6	44.51	16 10.54	8.88	16 15.95	0.133	15 4 27.75
8	Th	14 52 11.99	10.026	16 29 41.8	43.83	16 10.77	8.88	16 12.32	0.169	15 8 24.31
9	Fr	14 56 13.04	10.062	16 47 5.3	43.13	16 10.99	8.89	16 7.82	0.205	15 12 20.87
10	Sa	15 0 14.96	10.098	-17 4 11.7	-42.41	16 11.22	8.89	+16 2.46	-0.241	15 16 17.42
11	Su	15 4 17.73	10.134	17 21 0.7	41.67	16 11.44	8.89	15 58.25	0.277	15 20 13.98
12	Mo	15 8 21.37	10.169	17 37 31.8	40.92	16 11.66	8.89	15 49.17	0.313	15 24 10.53
13	Tu	15 12 25.86	10.205	17 53 44.7	40.15	16 11.88	8.90	15 41.23	0.349	15 28 7.09
14	We	15 16 31.21	10.241	18 9 38.8	39.36	16 12.10	8.90	15 32.43	0.384	15 32 3.65
15	Th	15 20 37.41	10.276	-18 25 13.8	-38.55	16 12.31	8.90	+15 22.79	-0.419	15 36 0.20
16	Fr	15 24 44.46	10.311	-18 40 29.3	-37.73	16 12.53	8.90	+15 12.30	-0.444	15 39 56.76

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aber-ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" ' "	"	"			"	"	"	23° 27'	h m s
Oct. 1	274	187 44 2.2	147.82	+0.33	0.000 3453	-51.9	37.64	+16.64	20.45	1.51	11 19 33.11
2	275	188 43 3.7	147.61	0.30	0.000 2211	51.7	37.78	16.60	20.45	1.49	11 15 37.20
3	276	189 42 7.4	147.70	0.23	0.000 0974	51.5	37.92	16.56	20.46	1.48	11 11 41.30
4	277	190 41 13.4	147.80	0.13	9.999 9741	51.3	38.06	16.52	20.47	1.46	11 7 45.39
5	278	191 40 21.6	147.89	+0.02	9.999 8512	51.3	38.19	16.48	20.47	1.45	11 3 49.48
6	279	192 39 32.1	147.99	-0.10	9.999 7285	-51.1	38.33	+16.44	20.48	1.43	10 59 53.57
7	280	193 38 45.0	148.09	0.23	9.999 6060	51.0	38.47	16.40	20.48	1.41	10 55 57.67
8	281	194 38 0.2	148.18	0.35	9.999 4836	51.0	38.61	16.37	20.49	1.39	10 52 1.76
9	282	195 37 17.7	148.28	0.47	9.999 3612	51.0	38.75	16.33	20.49	1.37	10 48 5.85
10	283	196 36 37.5	148.37	0.58	9.999 2388	51.0	38.88	16.30	20.50	1.35	10 44 9.95
11	284	197 35 59.6	148.47	-0.67	9.999 1163	-51.1	39.02	+16.26	20.51	1.33	10 40 14.04
12	285	198 35 24.0	148.56	0.74	9.998 9936	51.2	39.16	16.23	20.51	1.31	10 36 18.13
13	286	199 34 50.6	148.65	0.79	9.998 8707	51.2	39.30	16.20	20.52	1.29	10 32 22.22
14	287	200 34 19.3	148.74	0.80	9.998 7476	51.3	39.43	16.16	20.52	1.27	10 28 26.31
15	288	201 33 50.1	148.83	0.79	9.998 6243	51.4	39.57	16.13	20.53	1.25	10 24 30.41
16	289	202 33 23.1	148.91	-0.76	9.998 5008	-51.5	39.71	+16.10	20.54	1.22	10 20 34.50
17	290	203 32 58.0	149.00	0.70	9.998 3772	51.5	39.85	16.07	20.54	1.20	10 16 38.59
18	291	204 32 34.9	149.08	0.62	9.998 2534	51.6	39.98	16.05	20.55	1.18	10 12 42.68
19	292	205 32 13.7	149.16	0.50	9.998 1295	51.6	40.12	16.02	20.55	1.15	10 8 46.78
20	293	206 31 54.3	149.23	0.38	9.998 0057	51.6	40.26	16.00	20.56	1.13	10 4 50.87
21	294	207 31 36.7	149.30	-0.25	9.997 8820	-51.5	40.40	+15.97	20.56	1.10	10 0 54.96
22	295	208 31 20.8	149.37	-0.13	9.997 7587	51.3	40.53	15.95	20.57	1.08	9 56 59.05
23	296	209 31 6.6	149.44	0.00	9.997 6357	51.1	40.67	15.93	20.58	1.05	9 53 3.14
24	297	210 30 54.1	149.51	+0.11	9.997 5135	50.8	40.81	15.91	20.58	1.02	9 49 7.24
25	298	211 30 43.2	149.58	0.20	9.997 3920	50.4	40.95	15.89	20.59	1.00	9 45 11.33
26	299	212 30 34.0	149.65	+0.26	9.997 2716	-49.9	41.08	+15.87	20.59	0.97	9 41 15.42
27	300	213 30 26.5	149.73	0.29	9.997 1523	49.5	41.22	15.85	20.60	0.94	9 37 19.51
28	301	214 30 20.7	149.80	0.29	9.997 0343	48.9	41.36	15.84	20.60	0.91	9 33 23.60
29	302	215 30 16.8	149.87	0.26	9.996 9178	48.2	41.50	15.83	20.61	0.89	9 29 27.69
30	303	216 30 14.6	149.95	0.19	9.996 8028	47.6	41.63	15.82	20.62	0.86	9 25 31.79
31	304	217 30 14.4	150.03	+0.09	9.996 6893	-46.9	41.77	+15.80	20.62	0.83	9 21 35.88
Nov. 1	305	218 30 16.2	150.11	-0.02	9.996 5775	46.3	41.91	15.80	20.63	0.80	9 17 39.97
2	306	219 30 19.9	150.20	0.15	9.996 4671	45.7	42.05	15.79	20.63	0.77	9 13 44.06
3	307	220 30 25.7	150.28	0.28	9.996 3582	45.1	42.19	15.78	20.64	0.74	9 9 48.15
4	308	221 30 33.6	150.37	0.40	9.996 2508	44.5	42.32	15.78	20.64	0.72	9 5 52.24
5	309	222 30 43.5	150.46	-0.53	9.996 1446	-44.0	42.46	+15.78	20.65	0.69	9 1 56.33
6	310	223 30 55.6	150.55	0.64	9.996 0397	43.5	42.60	15.78	20.65	0.66	8 58 0.42
7	311	224 31 9.7	150.63	0.73	9.995 9359	43.0	42.74	15.78	20.66	0.63	8 54 4.51
8	312	225 31 25.8	150.71	0.80	9.995 8333	42.6	42.87	15.78	20.66	0.60	8 50 8.60
9	313	226 31 43.9	150.79	0.84	9.995 7316	42.1	43.01	15.78	20.67	0.57	8 46 12.69
10	314	227 32 3.9	150.87	-0.86	9.995 6310	-41.7	43.15	+15.79	20.67	0.54	8 42 16.78
11	315	228 32 25.9	150.96	0.85	9.995 5313	41.3	43.29	15.80	20.68	0.51	8 38 20.87
12	316	229 32 49.7	151.03	0.81	9.995 4325	41.0	43.42	15.80	20.68	0.48	8 34 24.96
13	317	230 33 15.3	151.10	0.76	9.995 3345	40.7	43.56	15.81	20.69	0.45	8 30 29.05
14	318	231 33 42.6	151.17	0.68	9.995 2373	40.3	43.70	15.83	20.69	0.42	8 26 33.14
15	319	232 34 11.5	151.24	-0.56	9.995 1410	-40.0	43.84	+15.84	20.69	0.39	8 22 37.23
16	320	233 34 42.0	151.30	-0.44	9.995 0455	-39.6	43.97	+15.86	20.70	0.37	8 18 41.32



## FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.		
		h	m	s	s	°	'	"	"	'	"	m	s	h	m	s
Nov. 16	Fr	15	24	44.46	10.811	—18	40	29.3	—37.73	16	12.53	8.90	+15 12.30	—0.454	15	39 56.76
17	Sa	15	28	52.34	10.845	18	55	24.9	36.90	16	12.74	8.90	15 0.98	0.489	15	43 53.31
18	Su	15	33	1.04	10.880	19	10	0.2	36.06	16	12.95	8.90	14 48.83	0.523	15	47 49.87
19	Mo	15	37	10.56	10.413	19	24	14.9	35.18	16	13.16	8.91	14 35.87	0.557	15	51 46.43
20	Tu	15	41	20.88	10.447	19	38	8.5	34.29	16	13.36	8.91	14 22.10	0.590	15	55 42.98
21	We	15	45	32.00	10.480	—19	51	40.6	—33.39	16	13.56	8.91	+14 7.54	—0.623	15	59 39.54
22	Th	15	49	43.90	10.512	20	4	51.0	32.48	16	13.76	8.91	13 52.19	0.655	16	3 36.10
23	Fr	15	53	56.58	10.544	20	17	39.3	31.54	16	13.96	8.91	13 36.08	0.687	16	7 32.65
24	Sa	15	58	10.02	10.576	20	30	5.0	30.60	16	14.14	8.92	13 19.20	0.719	16	11 29.21
25	Su	16	2	24.21	10.607	20	42	8.0	29.65	16	14.33	8.92	13 1.56	0.750	16	15 25.77
26	Mo	16	6	39.14	10.637	—20	53	47.9	—28.68	16	14.51	8.92	+12 43.19	—0.781	16	19 22.33
27	Tu	16	10	54.80	10.668	21	5	4.3	27.69	16	14.69	8.92	12 24.09	0.811	16	23 18.88
28	We	16	15	11.18	10.697	21	15	57.0	26.70	16	14.86	8.92	12 4.26	0.841	16	27 15.44
29	Th	16	19	28.26	10.726	21	26	25.6	25.69	16	15.02	8.92	11 43.73	0.870	16	31 12.00
30	Fr	16	23	46.04	10.755	21	36	29.8	24.66	16	15.18	8.93	11 22.51	0.898	16	35 8.55
Dec. 1	Sa	16	28	4.50	10.788	—21	46	9.4	—23.63	16	15.34	8.93	+11 0.61	—0.926	16	39 5.11
2	Su	16	32	23.62	10.810	21	55	24.0	22.58	16	15.49	8.93	10 38.05	0.958	16	43 1.67
3	Mo	16	36	43.38	10.836	22	4	13.3	21.52	16	15.63	8.93	10 14.85	0.989	16	46 58.23
4	Tu	16	41	3.76	10.862	22	12	37.1	20.46	16	15.77	8.93	9 51.02	1.006	16	50 54.79
5	We	16	45	24.75	10.887	22	20	35.1	19.38	16	15.90	8.93	9 26.60	1.030	16	54 51.34
6	Th	16	49	46.31	10.910	—22	28	7.1	—18.29	16	16.03	8.93	+ 9 1.59	—1.054	16	58 47.90
7	Fr	16	54	8.42	10.932	22	35	12.8	17.19	16	16.15	8.93	8 36.04	1.076	17	2 44.46
8	Sa	16	58	31.05	10.954	22	41	52.0	16.06	16	16.27	8.94	8 9.96	1.097	17	6 41.02
9	Su	17	2	54.18	10.974	22	48	4.4	14.96	16	16.39	8.94	7 43.39	1.117	17	10 37.58
10	Mo	17	7	17.78	10.993	22	53	49.9	13.83	16	16.50	8.94	7 16.35	1.136	17	14 34.13
11	Tu	17	11	41.82	11.010	—22	59	8.3	—12.70	16	16.61	8.94	+ 6 48.87	—1.153	17	18 30.69
12	We	17	16	6.25	11.026	23	3	59.3	11.56	16	16.71	8.94	6 21.00	1.169	17	22 27.25
13	Th	17	20	31.05	11.041	23	8	22.9	10.41	16	16.82	8.94	5 52.75	1.184	17	26 23.81
14	Fr	17	24	56.19	11.054	23	12	18.8	9.25	16	16.91	8.94	5 24.18	1.197	17	30 20.37
15	Sa	17	29	21.62	11.065	23	15	47.0	8.09	16	17.01	8.94	4 55.30	1.209	17	34 16.92
16	Su	17	33	47.31	11.075	—23	18	47.3	—6.93	16	17.10	8.94	+ 4 26.17	—1.219	17	38 13.48
17	Mo	17	38	13.22	11.084	23	21	19.6	5.76	16	17.18	8.94	3 56.82	1.227	17	42 10.04
18	Tu	17	42	39.32	11.091	23	23	23.8	4.59	16	17.27	8.94	3 27.28	1.234	17	46 6.60
19	We	17	47	5.56	11.096	23	24	59.9	3.42	16	17.35	8.95	2 57.60	1.239	17	50 3.16
20	Th	17	51	31.91	11.100	23	26	7.9	2.24	16	17.42	8.95	2 27.81	1.243	17	53 59.72
21	Fr	17	55	58.33	11.102	—23	26	47.6	—1.07	16	17.49	8.95	+ 1 57.94	—1.245	17	57 56.27
22	Sa	18	0	24.79	11.103	23	26	50.1	+ 0.11	16	17.56	8.95	1 28.04	1.246	18	1 52.83
23	Su	18	4	51.26	11.103	23	26	42.4	1.29	16	17.61	8.95	0 58.13	1.246	18	5 49.39
24	Mo	18	9	17.70	11.101	23	25	57.4	2.46	16	17.67	8.95	+ 0 28.24	1.244	18	9 45.95
25	Tu	18	13	44.09	11.096	23	24	44.2	3.64	16	17.72	8.95	— 0 1.58	1.241	18	13 42.51
26	We	18	18	10.38	11.093	—23	23	2.8	+ 4.81	16	17.76	8.95	— 0 31.32	—1.237	18	17 39.07
27	Th	18	22	36.56	11.088	23	20	53.3	5.98	16	17.80	8.95	1 0.94	1.231	18	21 35.62
28	Fr	18	27	2.59	11.081	23	18	15.6	7.15	16	17.83	8.95	1 30.41	1.225	18	25 32.18
29	Sa	18	31	28.45	11.073	23	15	9.9	8.32	16	17.85	8.95	1 59.71	1.217	18	29 28.74
30	Su	18	35	54.10	11.064	23	11	36.2	9.48	16	17.87	8.95	2 28.80	1.208	18	33 25.30
31	Mo	18	40	19.51	11.053	—23	7	34.7	+10.64	16	17.88	8.95	— 2 57.66	—1.197	18	37 21.86
32	Tu	18	44	44.66	11.042	—23	3	5.4	+11.80	16	17.88	8.95	— 3 26.25	—1.185	18	41 18.41

## FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Pres. in Long.	Nut. in Long.	Aber. ration.	True Obliquity.	Mean Time of Sidereal Noon.
		" " "	"	"			"	"	"	23° 26'	h m s
Nov. 16	320	233 34 42.0	151.30	-0.44	9.995 0455	-39.6	43.97	+15.86	20.70	60.37	8 18 41.32
17	321	234 35 14.0	151.36	0.31	9.994 9510	39.2	44.11	15.87	20.70	60.34	8 14 45.41
18	322	235 35 47.4	151.42	0.17	9.994 8574	38.8	44.25	15.89	20.71	60.31	8 10 49.50
19	323	236 36 22.0	151.47	-0.04	9.994 7649	38.3	44.39	15.91	20.71	60.28	8 6 53.59
20	324	237 36 57.9	151.52	+0.08	9.994 6736	37.8	44.52	15.93	20.72	60.25	8 2 57.68
21	325	238 37 35.0	151.57	+0.17	9.994 5837	-37.1	44.66	+15.95	20.72	60.23	7 59 1.77
22	326	239 38 13.2	151.61	0.24	9.994 4955	36.4	44.80	15.98	20.73	60.20	7 55 5.86
23	327	240 38 52.5	151.66	0.28	9.994 4089	35.7	44.94	16.00	20.73	60.17	7 51 9.95
24	328	241 39 32.9	151.71	0.29	9.994 3243	34.8	45.08	16.03	20.73	60.14	7 47 14.04
25	329	242 40 14.4	151.75	0.27	9.994 2417	34.0	45.21	16.06	20.74	60.12	7 43 18.13
26	330	243 40 57.0	151.80	+0.21	9.994 1613	-33.0	45.35	+16.09	20.74	60.09	7 39 22.21
27	331	244 41 40.7	151.85	0.12	9.994 0832	32.0	45.49	16.12	20.75	60.07	7 35 26.30
28	332	245 42 25.7	151.90	+0.02	9.994 0076	31.0	45.63	16.15	20.75	60.04	7 31 30.39
29	333	246 43 11.8	151.95	-0.10	9.993 9344	30.0	45.76	16.19	20.75	60.02	7 27 34.48
30	334	247 43 59.2	152.00	0.23	9.993 8636	29.0	45.90	16.22	20.76	59.99	7 23 38.57
Dec. 1	335	248 44 47.9	152.06	-0.36	9.993 7953	-28.0	46.04	+16.25	20.76	59.97	7 19 42.66
2	336	249 45 38.0	152.11	0.49	9.993 7294	27.0	46.18	16.29	20.76	59.95	7 15 46.74
3	337	250 46 29.3	152.17	0.60	9.993 6658	26.0	46.31	16.33	20.76	59.92	7 11 50.83
4	338	251 47 22.0	152.22	0.71	9.993 6044	25.1	46.45	16.37	20.77	59.90	7 7 54.92
5	339	252 48 16.0	152.28	0.78	9.993 5451	24.2	46.59	16.41	20.77	59.88	7 3 59.01
6	340	253 49 11.2	152.33	-0.84	9.993 4880	-23.4	46.73	+16.45	20.77	59.86	7 0 3.10
7	341	254 50 7.8	152.38	0.85	9.993 4328	22.6	46.86	16.49	20.78	59.84	6 56 7.18
8	342	255 51 5.5	152.43	0.85	9.993 3796	21.8	47.00	16.53	20.78	59.82	6 52 11.27
9	343	256 52 4.4	152.48	0.82	9.993 3282	21.1	47.14	16.58	20.78	59.80	6 48 15.36
10	344	257 53 4.4	152.52	0.76	9.993 2785	20.3	47.28	16.62	20.78	59.78	6 44 19.45
11	345	258 54 5.5	152.57	-0.68	9.993 2306	-19.6	47.41	+16.67	20.79	59.77	6 40 23.54
12	346	259 55 7.6	152.60	0.58	9.993 1842	19.0	47.55	16.71	20.79	59.75	6 36 27.62
13	347	260 56 10.6	152.64	0.46	9.993 1394	18.4	47.69	16.76	20.79	59.73	6 32 31.71
14	348	261 57 14.4	152.67	0.31	9.993 0960	17.8	47.83	16.81	20.79	59.72	6 28 35.80
15	349	262 58 18.9	152.70	0.17	9.993 0542	17.1	47.96	16.85	20.79	59.70	6 24 39.89
16	350	263 59 24.0	152.72	-0.04	9.993 0139	-16.5	48.10	+16.90	20.80	59.69	6 20 43.98
17	351	265 0 29.6	152.74	+0.09	9.992 9751	15.8	48.24	16.95	20.80	59.67	6 16 48.06
18	352	266 1 35.6	152.76	0.21	9.992 9380	15.1	48.38	17.00	20.80	59.66	6 12 52.15
19	353	267 2 41.9	152.77	0.29	9.992 9027	14.3	48.52	17.04	20.80	59.65	6 8 56.24
20	354	268 3 48.4	152.78	0.35	9.992 8693	13.5	48.65	17.09	20.80	59.63	6 5 0.33
21	355	269 4 55.1	152.78	+0.37	9.992 8381	-12.6	48.79	+17.14	20.80	59.62	6 1 4.41
22	356	270 6 2.0	152.79	0.35	9.992 8090	11.6	48.93	17.19	20.81	59.61	5 57 8.50
23	357	271 7 9.0	152.79	0.31	9.992 7824	10.6	49.07	17.24	20.81	59.60	5 53 12.59
24	358	272 8 16.1	152.80	0.23	9.992 7583	9.5	49.20	17.29	20.81	59.59	5 49 16.67
25	359	273 9 23.4	152.81	0.14	9.992 7368	8.4	49.34	17.34	20.81	59.59	5 45 20.76
26	360	274 10 30.7	152.81	+0.02	9.992 7181	-7.2	49.48	+17.39	20.81	59.58	5 41 24.85
27	361	275 11 38.2	152.82	-0.12	9.992 7022	6.0	49.62	17.43	20.81	59.57	5 37 28.94
28	362	276 12 45.9	152.82	0.24	9.992 6891	4.8	49.75	17.48	20.81	59.57	5 33 33.03
29	363	277 13 53.8	152.83	0.37	9.992 6790	3.6	49.89	17.53	20.81	59.56	5 29 37.11
30	364	278 15 1.9	152.84	0.50	9.992 6716	2.5	50.03	17.58	20.81	59.56	5 25 41.20
31	365	279 16 10.2	152.85	-0.61	9.992 6670	-1.4	50.17	+17.62	20.81	59.55	5 21 45.29
32	366	280 17 18.8	152.86	-0.69	9.992 6651	-0.2	50.30	+17.67	20.81	59.55	5 17 49.38

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.	
	True Equinox.			True Equinox.			True Equinox.			
	Noon.	Midnight.		Noon.	Midnight.		Noon.	Midnight.		
Jan.	1	+0.179 8639	+0.188 4540	-776	-0.886 8288	-0.885 3217	-184	-0.384 6965	-0.384 0428	+ 60
	2	0.197 0291	0.205 5885	782	0.883 7459	0.882 1013	198	0.383 3592	0.382 6459	54
	3	0.214 1317	0.222 6579	788	0.880 3884	0.878 6071	212	0.381 9030	0.381 1305	47
	4	0.231 1666	0.239 6571	793	0.876 7579	0.874 8408	226	0.380 3284	0.379 4971	40
	5	0.248 1287	0.256 5809	798	0.872 8560	0.870 8035	241	0.378 6364	0.377 7463	33
	6	+0.265 0131	+0.273 4247	-803	-0.868 6836	-0.866 4962	-256	-0.376 8270	-0.375 8785	+ 26
	7	0.281 8150	0.290 1834	807	0.864 2419	0.861 9207	271	0.374 9009	0.373 8943	19
	8	0.298 5293	0.306 8522	811	0.859 5328	0.857 0782	286	0.372 8588	0.371 7943	12
	9	0.315 1513	0.323 4261	814	0.854 5572	0.851 9699	302	0.370 7010	0.369 5790	+ 4
	10	0.331 6759	0.339 9002	817	0.849 3167	0.846 5978	318	0.368 4284	0.367 2493	- 3
	11	+0.348 0983	+0.356 2696	-820	-0.843 8133	-0.840 9634	-334	-0.366 0417	-0.364 8057	- 11
	12	0.364 4135	0.372 5295	822	0.838 0482	0.835 0679	350	0.363 5413	0.362 2487	18
	13	0.380 6169	0.388 6751	824	0.832 0228	0.828 9130	366	0.360 9279	0.359 5790	26
	14	0.396 7034	0.404 7011	826	0.825 7388	0.822 5005	382	0.358 2022	0.356 7975	34
	15	0.412 6678	0.420 6029	827	0.819 1982	0.815 8322	399	0.355 3651	0.353 9050	42
	16	+0.428 5056	+0.436 3754	-827	-0.812 4027	-0.808 9098	-415	-0.352 4172	-0.350 9019	- 50
	17	0.444 2116	0.452 0137	827	0.805 3539	0.801 7353	432	0.349 3593	0.347 7894	58
	18	0.459 7809	0.467 5127	827	0.798 0542	0.794 3107	448	0.346 1924	0.344 5683	66
	19	0.475 2084	0.482 8674	827	0.790 5052	0.786 6379	465	0.342 9172	0.341 2394	74
	20	0.490 4890	0.498 0726	826	0.782 7092	0.778 7194	482	0.339 5349	0.337 8038	82
	21	+0.505 6175	+0.513 1232	-824	-0.774 6688	-0.770 5576	-499	-0.336 0463	-0.334 2626	- 90
	22	0.520 5889	0.528 0140	822	0.766 3862	0.762 1548	516	0.332 4527	0.330 6168	98
	23	0.535 3980	0.542 7402	820	0.757 8639	0.753 5140	533	0.328 7551	0.326 8678	107
	24	0.550 0400	0.557 2968	817	0.749 1053	0.744 6382	550	0.324 9552	0.323 0172	116
	25	0.564 5100	0.571 6790	813	0.740 1132	0.735 5308	567	0.321 0539	0.319 0657	124
	26	+0.578 8032	+0.585 8821	-809	-0.730 8912	-0.726 1949	-584	-0.317 0528	-0.315 0154	-132
	27	0.592 9153	0.599 9021	805	0.721 4423	0.716 6338	601	0.312 9537	0.310 8678	141
	28	0.606 8421	0.613 7347	800	0.711 7099	0.706 8510	618	0.308 7578	0.306 6240	150
	29	0.620 5793	0.627 3755	795	0.701 8775	0.696 8500	635	0.304 4665	0.302 2856	158
	30	0.634 1229	0.640 8210	789	0.691 7687	0.686 6340	652	0.300 0815	0.297 8543	166
Feb.	31	+0.647 4693	+0.654 0673	-783	-0.681 4466	-0.676 2068	-668	-0.295 6043	-0.293 3316	-175
	1	0.660 6145	0.667 1105	776	0.670 9150	0.665 5718	685	0.291 0363	0.288 7187	184
	2	0.673 5549	0.679 9472	769	0.660 1774	0.654 7323	701	0.286 3790	0.284 0172	192
	3	0.686 2870	0.692 5738	761	0.649 2370	0.643 6920	718	0.281 6336	0.279 2285	200
	4	0.698 8071	0.704 9866	753	0.638 0976	0.632 4542	734	0.276 8021	0.274 3544	209
	5	+0.711 1118	+0.717 1824	-744	-0.626 7622	-0.621 0222	-750	-0.271 8857	-0.269 3961	-218
	6	0.723 1980	0.729 1580	735	0.615 2346	0.609 3999	766	0.266 8858	0.264 3550	226
	7	0.735 0620	0.740 9096	726	0.603 5184	0.597 5906	782	0.261 8040	0.259 2329	234
	8	0.746 7004	0.752 4341	716	0.591 6171	0.585 5981	798	0.256 6419	0.254 0311	243
	9	0.758 1102	0.763 7282	706	0.579 5342	0.573 4257	814	0.251 4007	0.248 7511	252
	10	+0.769 2877	+0.774 7886	-695	-0.567 2731	-0.561 0768	-830	-0.246 0823	-0.243 3945	-260
	11	0.780 2304	0.785 6124	684	0.554 8374	0.548 5553	845	0.240 6880	0.237 9629	268
	12	0.790 9344	0.796 1960	672	0.542 2310	0.535 8648	860	0.235 2194	0.232 4578	277
	13	0.801 3967	0.806 5363	660	0.529 4572	0.523 0089	875	0.229 6781	0.226 8807	286
	14	0.811 6142	0.816 6300	647	0.516 5203	0.509 9916	890	0.224 0658	0.221 2335	294
	15	+0.821 5833	+0.826 4739	-634	-0.503 4235	-0.496 8164	-904	-0.218 3841	-0.215 5177	-302
	16	+0.831 3013	+0.836 0651	-621	-0.490 1709	-0.483 4874	-918	-0.212 6346	-0.209 7350	-310

## GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1917.0.
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
Feb. 16	+0.831 3013	+0.836 0651	-621	-0.490 1709	-0.483 4874	-918	-0.212 6346	-0.209 7350	-310
17	0.840 7648	0.845 4001	607	0.476 7665	0.470 0086	932	0.206 8192	0.203 8873	319
18	0.849 9706	0.854 4760	593	0.463 2144	0.456 3842	946	0.200 9396	0.197 9784	327
19	0.858 9158	0.863 2896	578	0.449 5187	0.442 6185	959	0.194 9979	0.192 0043	335
20	0.867 5970	0.871 8377	563	0.435 6841	0.428 7161	972	0.188 9958	0.185 9728	343
21	+0.876 0114	+0.880 1179	-548	-0.421 7150	-0.414 6814	-985	-0.182 9355	-0.179 8841	-351
22	0.884 1567	0.888 1276	532	0.407 6160	0.400 5192	998	0.176 8189	0.173 7402	359
23	0.892 0302	0.895 8643	516	0.393 3918	0.386 2345	1010	0.170 6482	0.167 5433	367
24	0.899 6296	0.903 3259	499	0.379 0477	0.371 8320	1022	0.164 4256	0.161 2954	374
25	0.906 9529	0.910 5105	482	0.364 5880	0.357 3165	1034	0.158 1531	0.154 9989	381
26	+0.913 9983	+0.917 4162	-465	-0.350 0181	-0.342 6933	-1046	-0.151 8330	-0.148 6557	-389
27	0.920 7640	0.924 0414	448	0.335 3427	0.327 9668	1057	0.145 4671	0.142 2676	397
28	0.927 2483	0.930 3845	430	0.320 5663	0.313 1416	1068	0.139 0575	0.135 8370	404
Mar. 1	0.933 4499	0.936 4444	412	0.305 6935	0.298 2226	1079	0.132 6064	0.129 3658	412
2	0.939 3677	0.942 2197	393	0.290 7293	0.283 2143	1089	0.126 1156	0.122 8559	419
3	+0.945 0003	+0.947 7092	-374	-0.275 6781	-0.268 1213	-1099	-0.119 5870	-0.116 3092	-426
4	0.950 3464	0.952 9117	355	0.260 5444	0.252 9482	1109	0.113 0228	0.109 7279	433
5	0.955 4050	0.957 8262	336	0.245 3332	0.237 6998	1118	0.106 4249	0.103 1139	440
6	0.960 1750	0.962 4513	316	0.230 0487	0.222 3804	1127	0.099 7952	0.096 4690	446
7	0.964 6551	0.966 7864	296	0.214 6954	0.206 9944	1136	0.093 1355	0.089 7951	453
8	+0.968 8450	+0.970 8306	-276	-0.199 2779	-0.191 5464	-1144	-0.086 4479	-0.083 0942	-459
9	0.972 7432	0.974 5826	256	0.183 8006	0.176 0409	1152	0.079 7342	0.076 3682	466
10	0.976 3489	0.978 0420	235	0.168 2680	0.160 4823	1159	0.072 9964	0.069 6190	472
11	0.979 6816	0.981 2078	214	0.152 6844	0.144 8749	1166	0.066 2363	0.062 8485	478
12	0.982 6804	0.984 0793	193	0.137 0543	0.129 2232	1173	0.059 4558	0.056 0586	484
13	+0.985 4044	+0.986 6556	-172	-0.121 3822	-0.113 5318	-1180	-0.052 6571	-0.049 2515	-490
14	0.987 8329	0.988 9360	150	0.105 6726	0.097 8051	1186	0.045 8420	0.042 4288	495
15	0.989 9650	0.990 9198	128	0.089 9299	0.082 0476	1192	0.039 0123	0.035 5927	501
16	0.991 8002	0.992 6062	106	0.074 1588	0.066 2640	1197	0.032 1703	0.028 7452	506
17	0.993 3377	0.993 9944	84	0.058 3638	0.050 4588	1203	0.025 3178	0.021 8883	511
18	+0.994 5765	+0.995 0839	-62	-0.042 5496	-0.034 6369	-1208	-0.018 4570	-0.015 0241	-516
19	0.995 5166	0.995 8745	39	0.026 7213	0.018 8033	1212	0.011 5900	0.008 1549	521
20	0.996 1575	0.996 3655	-16	-0.010 8836	-0.002 9628	1216	-0.004 7190	-0.001 2827	526
21	0.996 4986	0.996 5568	+7	+0.004 9584	+0.012 8795	1219	+0.002 1537	+0.005 5900	531
22	0.996 5402	0.996 4487	30	0.020 7997	0.028 7184	1222	0.009 0259	0.012 4612	535
23	+0.996 2823	+0.996 0411	+53	+0.036 6350	+0.044 5489	-1225	+0.015 8954	+0.019 3284	-539
24	0.995 7250	0.995 3343	77	0.052 4523	0.060 3657	1228	0.022 7599	0.026 1896	543
25	0.994 8691	0.994 3294	100	0.068 2674	0.076 1638	1230	0.029 6173	0.033 0426	547
26	0.993 7151	0.993 0266	124	0.084 0542	0.091 9381	1232	0.036 4652	0.039 8850	550
27	0.992 2642	0.991 4278	148	0.099 8149	0.107 6840	1234	0.043 3018	0.046 7151	554
28	+0.990 5176	+0.989 5335	+172	+0.115 5448	+0.123 3966	-1235	+0.050 1248	+0.053 5306	-557
29	0.988 4758	0.987 3448	196	0.131 2388	0.139 0710	1236	0.056 9322	0.060 3294	560
30	0.986 1405	0.984 8632	220	0.146 8925	0.154 7028	1237	0.063 7220	0.067 1098	563
31	0.983 5129	0.982 0898	244	0.162 5012	0.170 2873	1237	0.070 4924	0.073 8696	566
Apr. 1	0.980 5941	0.979 0260	269	0.178 0604	0.185 8201	1237	0.077 2412	0.080 6070	568
2	+0.977 3858	+0.975 6734	+294	+0.193 5659	+0.201 2970	-1236	+0.083 9667	+0.087 3202	-570
3	+0.973 8891	+0.972 0331	+318	+0.209 0130	+0.216 7134	-1235	+0.090 6671	+0.094 0072	-572

SUN, 1917.

GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1917.0.
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
yr. 1	+0.980 5941	+0.979 0260	+ 269	+0.178 0604	+0.185 8201	-1237	+0.077 2412	+0.080 6070	-568
2	0.977 3858	0.975 6734	294	0.193 5659	0.201 2970	1236	0.083 9667	0.087 3202	570
3	0.973 8891	0.972 0331	318	0.209 0130	0.216 7134	1235	0.090 6671	0.094 0072	572
4	0.970 1056	0.968 1067	343	0.224 3976	0.232 0651	1234	0.097 3403	0.100 6663	574
5	0.966 0367	0.963 8958	368	0.239 7153	0.247 3478	1232	0.103 9848	0.107 2955	576
6	+0.961 6842	+0.959 4022	+ 392	+0.254 9620	+0.262 5574	-1230	+0.110 5984	+0.113 8932	-578
7	0.957 0498	0.954 6272	417	0.270 1335	0.277 6898	1228	0.117 1797	0.120 4575	579
8	0.952 1346	0.949 5721	442	0.285 2257	0.292 7409	1225	0.123 7266	0.126 9867	580
9	0.946 9400	0.944 2387	467	0.300 2347	0.307 7066	1222	0.130 2376	0.133 4790	581
10	0.941 4685	0.938 6293	493	0.315 1561	0.322 5828	1219	0.136 7108	0.139 9327	582
11	+0.935 7212	+0.932 7444	+ 518	+0.329 9862	+0.337 3657	-1215	+0.143 1444	+0.146 3459	-582
12	0.929 6993	0.926 5861	543	0.344 7208	0.352 0510	1211	0.149 5368	0.152 7169	583
13	0.923 4049	0.920 1560	568	0.359 3557	0.366 6345	1206	0.155 8859	0.159 0437	583
14	0.916 8396	0.913 4560	594	0.373 8869	0.381 1123	1201	0.162 1901	0.165 3248	583
15	0.910 0052	0.906 4874	619	0.388 3100	0.395 4797	1196	0.168 4474	0.171 5578	583
16	+0.902 9031	+0.899 2525	+ 644	+0.402 6208	+0.409 7328	-1190	+0.174 6558	+0.177 7412	-582
17	0.895 5359	0.891 7535	669	0.416 8151	0.423 8671	1184	0.180 8137	0.183 8730	581
18	0.887 9056	0.883 9923	694	0.430 8883	0.437 8783	1178	0.186 9189	0.189 9512	580
19	0.880 0139	0.875 9709	719	0.444 8363	0.451 7618	1171	0.192 9696	0.195 9738	579
20	0.871 8637	0.867 6925	744	0.458 6543	0.465 5134	1164	0.198 9637	0.201 9391	577
21	+0.863 4578	+0.859 1599	+ 769	+0.472 3384	+0.479 1288	-1157	+0.204 8996	+0.207 8451	-575
22	0.854 7990	0.850 3755	794	0.485 8841	0.492 6039	1149	0.210 7754	0.213 6902	573
23	0.845 8898	0.841 3425	820	0.499 2875	0.505 9345	1141	0.216 5892	0.219 4723	570
24	0.836 7340	0.832 0645	845	0.512 5444	0.519 1168	1133	0.222 3393	0.225 1900	568
25	0.827 3344	0.822 5442	870	0.525 6511	0.532 1469	1124	0.228 0242	0.230 8416	565
26	+0.817 6945	+0.812 7854	+ 895	+0.538 6038	+0.545 0212	-1115	+0.233 6421	+0.236 4255	-562
27	0.807 8174	0.802 7911	920	0.551 3988	0.557 7361	1105	0.239 1917	0.241 9404	559
28	0.797 7068	0.792 5648	945	0.564 0326	0.570 2880	1095	0.244 6714	0.247 3846	556
29	0.787 3657	0.782 1099	970	0.576 5018	0.582 6736	1085	0.250 0797	0.252 7567	553
30	0.776 7977	0.771 4295	995	0.588 8030	0.594 8897	1074	0.255 4153	0.258 0554	549
ay 1	+0.766 0060	+0.760 5275	+1020	+0.600 9333	+0.606 9332	-1063	+0.260 6767	+0.263 2791	-545
2	0.754 9945	0.749 4073	1045	0.612 8892	0.618 8008	1052	0.265 8625	0.268 4268	541
3	0.743 7664	0.738 0721	1069	0.624 6677	0.630 4894	1040	0.270 9717	0.273 4970	536
4	0.732 3251	0.726 5257	1093	0.636 2657	0.641 9963	1028	0.276 0027	0.278 4886	531
5	0.720 6743	0.714 7713	1118	0.647 6807	0.653 3185	1015	0.280 9544	0.283 4000	526
6	+0.708 8171	+0.702 8122	+1142	+0.658 9094	+0.664 4532	-1002	+0.285 8254	+0.288 2303	-521
7	0.696 7569	0.690 6518	1166	0.669 9495	0.675 3977	989	0.290 6147	0.292 9783	516
8	0.684 4973	0.678 2938	1190	0.680 7977	0.686 1491	975	0.295 3209	0.297 6425	510
9	0.672 0418	0.665 7415	1214	0.691 4516	0.696 7048	961	0.299 9430	0.302 2221	504
10	0.659 3934	0.652 9979	1238	0.701 9084	0.707 0619	946	0.304 4796	0.306 7154	498
11	+0.646 5555	+0.640 0665	+1261	+0.712 1650	+0.717 2175	-931	+0.308 9294	+0.311 1214	-492
12	0.633 5315	0.626 9508	1285	0.722 2190	0.727 1691	916	0.313 2913	0.315 4388	486
13	0.620 3249	0.613 6542	1308	0.732 0673	0.736 9133	900	0.317 5638	0.319 6662	479
14	0.606 9392	0.600 1805	1331	0.741 7067	0.746 4473	884	0.321 7458	0.323 8024	472
15	0.593 3784	0.586 5334	1354	0.751 1346	0.755 7683	868	0.325 8359	0.327 8460	465
16	+0.579 6460	+0.572 7166	+1377	+0.760 3480	+0.764 8735	-851	+0.329 8326	+0.331 7957	-458
17	+0.565 7458	+0.558 7343	+1400	+0.769 3443	+0.773 7600	-834	+0.333 7351	+0.335 6505	-450

## GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1917.0.
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
May 17	+0.565 7458	+0.558 7343	+1400	+0.769 3443	+0.773 7600	-834	+0.333 7351	+0.335 6505	-450
18	0.551 6824	0.544 5907	1422	0.778 1202	0.782 4248	816	0.337 5419	0.339 4090	442
19	0.537 4598	0.530 2901	1444	0.786 6734	0.790 8655	798	0.341 2517	0.343 0700	434
20	0.523 0823	0.515 8370	1466	0.795 0010	0.799 0795	780	0.344 8636	0.346 6325	426
21	0.508 5547	0.501 2359	1488	0.803 1008	0.807 0644	761	0.348 3766	0.350 0956	417
22	+0.493 8813	+0.486 4913	+1509	+0.810 9701	+0.814 8177	-742	+0.351 7895	+0.353 4581	-409
23	0.479 0666	0.471 6078	1530	0.818 6069	0.822 3374	722	0.355 1014	0.356 7192	400
24	0.464 1156	0.456 5905	1551	0.826 0090	0.829 6214	702	0.358 3115	0.359 8781	391
25	0.449 0330	0.441 4437	1572	0.833 1744	0.836 6679	682	0.361 4189	0.362 9340	382
26	0.433 8232	0.426 1721	1592	0.840 1017	0.843 4754	661	0.364 4232	0.365 8863	373
27	+0.418 4909	+0.410 7802	+1612	+0.846 7888	+0.850 0419	-640	+0.367 3233	+0.368 7341	-363
28	0.403 0406	0.395 2728	1632	0.853 2343	0.856 3659	618	0.370 1186	0.371 4768	353
29	0.387 4772	0.379 6544	1652	0.859 4366	0.862 4462	596	0.372 8087	0.374 1140	343
30	0.371 8050	0.363 9296	1671	0.865 3946	0.868 2814	574	0.375 3928	0.376 6450	333
31	0.356 0288	0.348 1031	1690	0.871 1066	0.873 8700	551	0.377 8704	0.379 0691	322
June 1	+0.340 1531	+0.332 1794	+1709	+0.876 5714	+0.879 2107	-528	+0.380 2409	+0.381 3859	-312
2	0.324 1826	0.316 1631	1727	0.881 7879	0.884 3028	504	0.382 5040	0.383 5950	301
3	0.308 1214	0.300 0582	1745	0.886 7553	0.889 1453	480	0.384 6590	0.385 6960	290
4	0.291 9740	0.283 8694	1762	0.891 4726	0.893 7370	456	0.386 7057	0.387 6881	279
5	0.275 7449	0.267 6009	1779	0.895 9385	0.898 0769	431	0.388 6433	0.389 5712	268
6	+0.259 4381	+0.251 2569	+1796	+0.900 1521	+0.902 1641	-406	+0.390 4718	+0.391 3449	-256
7	0.243 0579	0.234 8415	1812	0.904 1128	0.905 9979	381	0.392 1905	0.393 0085	245
8	0.226 6084	0.218 3591	1828	0.907 8192	0.909 5767	355	0.393 7988	0.394 5615	233
9	0.210 0942	0.201 8141	1843	0.911 2701	0.912 8994	329	0.395 2965	0.396 0036	221
10	0.193 5194	0.185 2106	1858	0.914 4645	0.915 9654	302	0.396 6827	0.397 3339	209
11	+0.176 8884	+0.168 5532	+1873	+0.917 4018	+0.918 7735	-275	+0.397 9572	+0.398 5524	-197
12	0.160 2057	0.151 8464	1887	0.920 0803	0.921 3221	248	0.399 1194	0.399 6582	185
13	0.143 4760	0.135 0951	1901	0.922 4989	0.923 6106	221	0.400 1687	0.400 6508	173
14	0.126 7042	0.118 3040	1914	0.924 6571	0.925 6382	193	0.401 1046	0.401 5301	160
15	0.109 8950	0.101 4779	1927	0.926 5538	0.927 4038	165	0.401 9272	0.402 2957	147
16	+0.093 0534	+0.084 6220	+1939	+0.928 1881	+0.928 9068	-136	+0.402 6357	+0.402 9471	-134
17	0.076 1844	0.067 7413	1950	0.929 5596	0.930 1465	107	0.403 2299	0.403 4842	121
18	0.059 2932	0.050 8408	1961	0.930 6675	0.931 1226	78	0.403 7099	0.403 9069	108
19	0.042 3848	0.033 9257	1972	0.931 5116	0.931 8345	49	0.404 0753	0.404 2150	95
20	0.025 4643	0.017 0011	1982	0.932 0914	0.932 2824	-19	0.404 3260	0.404 4085	81
21	+0.008 5369	+0.000 0722	+1991	+0.932 4073	+0.932 4661	+11	+0.404 4623	+0.404 4875	-68
22	-0.008 3922	-0.016 8559	2000	0.932 4589	0.932 3857	41	0.404 4840	0.404 4519	54
23	0.025 3181	0.033 7783	2009	0.932 2466	0.932 0416	72	0.404 3912	0.404 3020	40
24	0.042 2359	0.050 6902	2017	0.931 7708	0.931 4341	103	0.404 1842	0.404 0380	26
25	0.059 1406	0.067 5865	2024	0.931 0316	0.930 5633	134	0.403 8633	0.403 6600	-12
26	-0.076 0272	-0.084 4622	+2031	+0.930 0295	+0.929 4302	+165	+0.403 4283	+0.403 1682	+2
27	0.092 8909	0.101 3127	2037	0.928 7655	0.928 0353	197	0.402 8798	0.402 5631	16
28	0.109 7269	0.118 1331	2042	0.927 2398	0.926 3791	229	0.402 2180	0.401 8446	30
29	0.126 5306	0.134 9188	2047	0.925 4533	0.924 4625	261	0.401 4431	0.401 0134	44
30	0.143 2972	0.151 6652	2051	0.923 4069	0.922 2864	293	0.400 5556	0.400 0697	59
July 1	-0.160 0222	-0.168 3677	+2055	+0.921 1012	+0.919 8514	+325	+0.399 5559	+0.399 0141	+73
2	-0.176 7011	-0.185 0219	+2058	+0.918 5373	+0.917 1589	+358	+0.398 4443	+0.397 8467	+88

GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.
	True Equinox.	True Equinox.		True Equinox.	True Equinox.		True Equinox.	True Equinox.	
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
July 1	-0.160 0222	-0.168 3677	+2055	+0.921 1012	+0.919 8514	+ 325	+0.399 5559	+0.399 0141	+ 73
2	0.176 7011	0.185 0219	2058	0.918 5373	0.917 1589	358	0.398 4443	0.397 8467	88
3	0.193 3296	0.201 6237	2060	0.915 7164	0.914 2098	391	0.397 2214	0.396 5682	102
4	0.209 9035	0.218 1686	2062	0.912 6392	0.911 0049	424	0.395 8871	0.395 1784	117
5	0.226 4184	0.234 6525	2063	0.909 3069	0.907 5451	457	0.394 4422	0.393 6784	131
6	-0.242 8703	-0.251 0713	+2063	+0.905 7197	+0.903 8309	+ 490	+0.392 8871	+0.392 0681	+146
7	0.259 2549	0.267 4206	2062	0.901 8789	0.899 8637	523	0.391 2216	0.390 3477	160
8	0.275 5678	0.283 6961	2061	0.897 7854	0.895 6440	557	0.389 4464	0.388 5178	175
9	0.291 8049	0.299 8936	2059	0.893 4397	0.891 1727	590	0.387 5618	0.386 5785	190
10	0.307 9616	0.316 0083	2057	0.888 8429	0.886 4504	624	0.385 5680	0.384 5302	205
11	-0.324 0332	-0.332 0357	+2054	+0.883 9955	+0.881 4783	+ 657	+0.383 4653	+0.382 3733	+220
12	0.340 0151	0.347 9709	2050	0.878 8989	0.876 2575	691	0.381 2543	0.380 1084	235
13	0.355 9026	0.363 8096	2045	0.873 5541	0.870 7888	725	0.378 9355	0.377 7357	250
14	0.371 6912	0.379 5469	2040	0.867 9618	0.865 0734	759	0.376 5091	0.375 2559	265
15	0.387 3759	0.395 1778	2034	0.862 1238	0.859 1130	793	0.373 9762	0.372 6700	280
16	-0.402 9519	-0.410 6977	+2027	+0.856 0414	+0.852 9092	+ 827	+0.371 3373	+0.369 9782	+295
17	0.418 4145	0.426 1018	2020	0.849 7166	0.846 4637	861	0.368 5929	0.367 1815	310
18	0.433 7589	0.441 3853	2012	0.843 1509	0.839 7782	894	0.365 7441	0.364 2807	325
19	0.448 9805	0.456 5439	2003	0.836 3459	0.832 8545	928	0.362 7915	0.361 2767	340
20	0.464 0749	0.471 5729	1993	0.829 3041	0.825 6949	962	0.359 7363	0.358 1704	355
21	-0.479 0373	-0.486 4676	+1983	+0.822 0272	+0.818 3014	+ 996	+0.356 5792	+0.354 9628	+370
22	0.493 8633	0.501 2238	1972	0.814 5177	0.810 6763	1029	0.353 3213	0.351 6548	384
23	0.508 5487	0.515 8374	1960	0.806 7776	0.802 8219	1063	0.349 9635	0.348 2474	399
24	0.523 0892	0.530 3036	1947	0.798 8095	0.794 7406	1096	0.346 5068	0.344 7418	414
25	0.537 4802	0.544 6186	1934	0.790 6158	0.786 4353	1129	0.342 9525	0.341 1390	429
26	-0.551 7181	-0.558 7783	+1920	+0.782 1994	+0.777 9082	+1162	+0.339 3016	+0.337 4403	+443
27	0.565 7987	0.572 7787	1905	0.773 5622	0.769 1616	1195	0.335 5553	0.333 6466	458
28	0.579 7179	0.586 6159	1889	0.764 7069	0.760 1985	1227	0.331 7144	0.329 7590	472
29	0.593 4723	0.600 2865	1873	0.755 6367	0.751 0218	1260	0.327 7805	0.325 7790	487
30	0.607 0580	0.613 7864	1856	0.746 3541	0.741 6341	1292	0.323 7546	0.321 7075	501
31	-0.620 4714	-0.627 1126	+1838	+0.736 8620	+0.732 0381	+1324	+0.319 6378	+0.317 5457	+516
Aug. 1	0.633 7094	0.640 2615	1820	0.727 1628	0.722 2365	1356	0.315 4312	0.313 2946	530
2	0.646 7684	0.653 2297	1801	0.717 2594	0.712 2318	1388	0.311 1360	0.308 9555	544
3	0.659 6450	0.666 0140	1781	0.707 1542	0.702 0269	1419	0.306 7533	0.304 5294	558
4	0.672 3361	0.678 6110	1760	0.696 8501	0.691 6240	1450	0.302 2840	0.300 0173	572
5	-0.684 8381	-0.691 0171	+1739	+0.686 3491	+0.681 0257	+1481	+0.297 7294	+0.295 4204	+586
6	0.697 1476	0.703 2291	1717	0.675 6542	0.670 2347	1512	0.293 0904	0.290 7396	600
7	0.709 2611	0.715 2433	1694	0.664 7676	0.659 2533	1542	0.288 3681	0.285 9760	613
8	0.721 1752	0.727 0561	1671	0.653 6920	0.648 0841	1572	0.283 5636	0.281 1309	627
9	0.732 8858	0.738 6638	1647	0.642 4300	0.636 7300	1601	0.278 6781	0.276 2053	640
10	-0.744 3897	-0.750 0628	+1622	+0.630 9844	+0.625 1938	+1630	+0.273 7127	+0.271 2006	+654
11	0.755 6828	0.761 2491	1597	0.619 3584	0.613 4785	1659	0.268 6691	0.266 1182	667
12	0.766 7614	0.772 2192	1571	0.607 5547	0.601 5873	1687	0.263 5482	0.260 9593	680
13	0.777 6221	0.782 9697	1544	0.595 5768	0.589 5237	1715	0.258 3517	0.255 7256	693
14	0.788 2615	0.793 4970	1516	0.583 4282	0.577 2907	1743	0.253 0812	0.250 4186	706
15	-0.798 6759	-0.803 7976	+1488	+0.571 1118	+0.564 8919	+1770	+0.247 7381	+0.245 0397	+718
16	-0.808 8619	-0.813 8684	+1459	+0.558 6315	+0.552 3309	+1797	+0.242 3236	+0.239 5902	+730

## GREENWICH MEAN TIME.

Date.	X			Reduc. to Mean Eq'x of 1917.0.	Y			Reduc. to Mean Eq'x of 1917.0.	Z			Reduc. to Mean Eq'x of 1917.0.
	True Equinox.				True Equinox.				True Equinox.			
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.			
Aug. 16	-0.808 8619	-0.813 8684	+1459	+0.558 6315	+0.552 3309	+1797	+0.242 3236	+0.239 5902	+ 730			
17	0.818 8164	0.823 7057	1430	0.545 9908	0.539 6115	1823	0.236 8397	0.234 0722	742			
18	0.828 5360	0.833 3069	1400	0.533 1936	0.526 7374	1849	0.231 2880	0.228 4872	754			
19	0.838 0179	0.842 6686	1369	0.520 2434	0.513 7123	1874	0.225 6700	0.222 8368	766			
20	0.847 2588	0.851 7882	1338	0.507 1444	0.500 5401	1899	0.219 9878	0.217 1230	778			
21	-0.856 2563	-0.860 6628	+1306	+0.493 9001	+0.487 2248	+1923	+0.214 2425	+0.211 3468	+ 789			
22	0.865 0074	0.869 2898	1274	0.480 5147	0.473 7704	1946	0.208 4362	0.205 5108	801			
23	0.873 5096	0.877 6665	1241	0.466 9923	0.460 1810	1969	0.202 5707	0.199 6162	812			
24	0.881 7602	0.885 7905	1208	0.453 3369	0.446 4606	1991	0.196 6475	0.193 6649	823			
25	0.889 7571	0.893 6597	1174	0.439 5526	0.432 6133	2013	0.190 6686	0.187 6587	833			
26	-0.897 4980	-0.901 2717	+1139	+0.425 6434	+0.418 6433	+2035	+0.184 6356	+0.181 5994	+ 844			
27	0.904 9806	0.908 6246	1104	0.411 6136	0.404 5547	2056	0.178 5504	0.175 4888	854			
28	0.912 2034	0.915 7168	1068	0.397 4672	0.390 3515	2077	0.172 4147	0.169 3284	864			
29	0.919 1645	0.922 5462	1032	0.383 2082	0.376 0377	2097	0.166 2300	0.163 1199	874			
30	0.925 8619	0.929 1113	996	0.368 8406	0.361 6173	2116	0.159 9982	0.156 8651	884			
31	-0.932 2940	-0.935 4099	+ 959	+0.354 3682	+0.347 0938	+2135	+0.153 7209	+0.150 5657	+ 893			
Sept. 1	0.938 4589	0.941 4408	921	0.339 7947	0.332 4713	2153	0.147 3996	0.144 2230	902			
2	0.944 3554	0.947 2024	883	0.325 1241	0.317 7536	2171	0.141 0360	0.137 8388	911			
3	0.949 9815	0.952 6924	845	0.310 3601	0.302 9441	2188	0.134 6317	0.131 4148	920			
4	0.955 3350	0.957 9091	806	0.295 5062	0.288 0468	2204	0.128 1883	0.124 9524	929			
5	-0.960 4144	-0.962 8508	+ 767	+0.280 5665	+0.273 0656	+2219	+0.121 7074	+0.118 4535	+ 937			
6	0.965 2180	0.967 5156	727	0.265 5447	0.258 0044	2234	0.115 1908	0.111 9196	945			
7	0.969 7433	0.971 9010	687	0.250 4451	0.242 8673	2248	0.108 6403	0.105 3529	953			
8	0.973 9884	0.976 0054	647	0.235 2715	0.227 6584	2262	0.102 0577	0.098 7550	960			
9	0.977 9518	0.979 8274	606	0.220 0285	0.212 3822	2275	0.095 4449	0.092 1276	967			
10	-0.981 6320	-0.983 3653	+ 565	+0.204 7201	+0.197 0428	+2287	+0.088 8036	+0.085 4730	+ 974			
11	0.985 0271	0.986 6173	524	0.189 3510	0.181 6452	2299	0.082 1361	0.078 7931	981			
12	0.988 1357	0.989 5820	482	0.173 9259	0.166 1936	2310	0.075 4442	0.072 0898	987			
13	0.990 9561	0.992 2579	440	0.158 4489	0.150 8925	2320	0.068 7300	0.065 3651	993			
14	0.993 4873	0.994 6441	398	0.142 9250	0.135 1469	2330	0.061 9954	0.058 6212	999			
15	-0.995 7281	-0.996 7392	+ 355	+0.127 3587	+0.119 5612	+2339	+0.055 2427	+0.051 8602	+1004			
16	0.997 6774	0.998 5426	312	0.111 7550	0.103 9405	2348	0.048 4739	0.045 0840	1009			
17	0.999 3347	1.000 0534	269	0.096 1184	0.088 2894	2355	0.041 6908	0.038 2947	1014			
18	1.000 6988	1.001 2709	226	0.080 4540	0.072 6128	2362	0.034 8958	0.031 4944	1019			
19	1.001 7695	1.002 1945	182	0.064 7664	0.056 9153	2368	0.028 0909	0.024 6854	1023			
20	-1.002 5460	-1.002 8240	+ 138	+0.049 0603	+0.041 2020	+2374	+0.021 2783	+0.017 8698	+1027			
21	1.003 0285	1.003 1593	94	0.033 3410	0.025 4779	2379	0.014 4600	0.011 0492	1031			
22	1.003 2164	1.003 1999	50	0.017 6132	+0.009 7475	2383	0.007 6379	+0.004 2262	1034			
23	1.003 1099	1.002 9463	+ 6	+0.001 8814	-0.005 9845	2387	+0.000 8144	-0.002 5973	1037			
24	1.002 7090	1.002 3982	- 39	-0.013 8495	0.021 7130	2390	-0.006 0086	0.009 4194	1040			
25	-1.002 0138	-1.001 5560	- 84	-0.029 5746	-0.037 4337	+2392	-0.012 8293	-0.016 2381	+1042			
26	1.001 0249	1.000 4205	129	0.045 2896	0.053 1418	2393	0.019 6456	0.023 0515	1044			
27	0.999 7430	0.998 9922	174	0.060 9898	0.068 8331	2394	0.026 4555	0.029 8575	1046			
28	0.998 1681	0.997 2710	219	0.076 6710	0.084 5030	2394	0.033 2572	0.036 6545	1047			
29	0.996 3011	0.995 2582	264	0.092 3287	0.100 1475	2393	0.040 0490	0.043 4406	1049			
30	-0.994 1423	-0.992 9534	- 309	-0.107 9588	-0.115 7621	+2392	-0.046 8290	-0.050 2139	+1050			
Oct. 1	-0.991 6918	-0.990 3575	- 354	-0.123 5569	-0.131 3427	+2390	-0.053 5952	-0.056 9727	+1050			



## GREENWICH MEAN TIME.

Date.	X		Reduc. to Mean Eq'x of 1917.0.	Y		Reduc. to Mean Eq'x of 1917.0.	Z		Reduc. to Mean Eq'x of 1917.0.	
	True Equinox.			True Equinox.			True Equinox.			
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	
Oct.	1	-0.991 6918	-0.990 3575	354	-0.123 5569	-0.131 3427	+2390	-0.053 5952	-0.056 9727	+1050
	2	0.988 9505	0.987 4707	400	0.139 1189	0.146 8850	2387	0.060 3460	0.063 7150	1050
	3	0.985 9184	0.984 2935	445	0.154 6406	0.162 3851	2383	0.067 0794	0.070 4390	1050
	4	0.982 5960	0.980 8261	491	0.170 1178	0.177 8383	2379	0.073 7936	0.077 1429	1049
	5	0.978 9839	0.977 0692	537	0.185 5459	0.193 2402	2374	0.080 4866	0.083 8245	1048
	6	-0.975 0822	-0.973 0228	582	-0.200 9206	-0.208 5865	+2368	-0.087 1565	-0.090 4822	+1046
	7	0.970 8913	0.968 6878	628	0.216 2372	0.223 8722	2362	0.093 8012	0.097 1135	1045
	8	0.966 4124	0.964 0650	673	0.231 4909	0.239 0928	2355	0.100 4188	0.103 7167	1043
	9	0.961 6458	0.959 1550	718	0.246 6773	0.254 2438	2347	0.107 0069	0.110 2894	1041
	10	0.956 5926	0.953 9587	763	0.261 7916	0.269 3202	2339	0.113 5638	0.116 8298	1038
	11	-0.951 2536	-0.948 4774	808	-0.276 8290	-0.284 3174	+2330	-0.120 0872	-0.123 3358	+1035
	12	0.945 6302	0.942 7121	854	0.291 7848	0.299 2305	2320	0.126 5751	0.129 8050	1032
	13	0.939 7235	0.936 6644	899	0.306 6540	0.314 0548	2309	0.133 0253	0.136 2357	1028
	14	0.933 5352	0.930 3359	944	0.321 4322	0.328 7855	2298	0.139 4359	0.142 6256	1024
	15	0.927 0668	0.923 7280	989	0.336 1143	0.343 4180	2286	0.145 8046	0.148 9728	1020
	16	-0.920 3198	-0.916 8426	1034	-0.350 6959	-0.357 9475	+2274	-0.152 1297	-0.155 2751	+1015
	17	0.913 2965	0.909 6817	1079	0.365 1721	0.372 3691	2261	0.158 4087	0.161 5304	1010
	18	0.905 9985	0.902 2473	1124	0.379 5380	0.386 6782	2247	0.164 6399	0.167 7370	1004
	19	0.898 4283	0.894 5417	1169	0.393 7891	0.400 8702	2232	0.170 8212	0.173 8925	998
	20	0.890 5880	0.886 5673	1213	0.407 9209	0.414 9407	2217	0.176 9506	0.179 9952	992
	21	-0.882 4800	-0.878 3265	1257	-0.421 9289	-0.428 8851	+2201	-0.183 0262	-0.186 0434	+ 985
	22	0.874 1072	0.869 8223	1301	0.435 8087	0.442 6991	2185	0.189 0464	0.192 0350	978
	23	0.865 4722	0.861 0573	1345	0.449 5559	0.456 3785	2168	0.195 0089	0.197 9681	971
	24	0.856 5778	0.852 0340	1389	0.463 1665	0.469 9194	2150	0.200 9122	0.203 8412	963
	25	0.847 4265	0.842 7556	1432	0.476 6366	0.483 3177	2131	0.206 7548	0.209 6527	955
	26	-0.838 0215	-0.833 2246	1475	-0.489 9621	-0.496 5695	+2111	-0.212 5348	-0.215 4007	+ 947
	27	0.828 3654	0.823 4441	1518	0.503 1392	0.509 6709	2091	0.218 2504	0.221 0837	939
	28	0.818 4610	0.813 4166	1561	0.516 1642	0.522 6186	2070	0.223 9003	0.226 7002	930
	29	0.808 3113	0.803 1452	1603	0.529 0337	0.535 4090	2049	0.229 4830	0.232 2486	921
	30	0.797 9187	0.792 6322	1645	0.541 7439	0.548 0380	2027	0.234 9967	0.237 7271	911
	31	-0.787 2862	-0.781 8809	1687	-0.554 2909	-0.560 5023	+2004	-0.240 4397	-0.243 1344	+ 901
Nov.	1	0.776 4166	0.770 8935	1728	0.566 6716	0.572 7983	1981	0.245 8108	0.248 4688	891
	2	0.765 3121	0.759 6728	1769	0.578 8820	0.584 9221	1957	0.251 1080	0.253 7283	880
	3	0.753 9760	0.748 2219	1810	0.590 9182	0.596 8699	1933	0.256 3295	0.258 9115	869
	4	0.742 4109	0.736 5433	1851	0.602 7767	0.608 6380	1908	0.261 4741	0.264 0169	858
	5	-0.730 6198	-0.724 6407	1891	-0.614 4535	-0.620 2226	+1882	-0.266 5398	-0.269 0426	+ 846
	6	0.718 6061	0.712 5166	1931	0.625 9449	0.631 6199	1855	0.271 5251	0.273 9869	834
	7	0.706 3726	0.700 1746	1971	0.637 2470	0.642 8259	1828	0.276 4280	0.278 8482	821
	8	0.693 9229	0.687 6180	2010	0.648 3560	0.653 8369	1800	0.281 2471	0.283 6246	809
	9	0.681 2606	0.674 8509	2049	0.659 2681	0.664 6493	1772	0.285 9806	0.288 3149	796
	10	-0.668 3894	-0.661 8764	2087	-0.669 9798	-0.675 2592	+1743	-0.290 6271	-0.292 9172	+ 783
	11	0.655 3126	0.648 6984	2125	0.680 4871	0.685 6631	1713	0.295 1848	0.297 4299	769
	12	0.642 0344	0.635 3210	2162	0.690 7866	0.695 8572	1682	0.299 6522	0.301 8515	755
	13	0.628 5587	0.621 7479	2199	0.700 8745	0.705 8380	1651	0.304 0277	0.306 1805	741
	14	0.614 8894	0.607 9836	2236	0.710 7473	0.715 6021	1619	0.308 3097	0.310 4153	726
	15	-0.601 0311	-0.594 0324	2272	-0.720 4020	-0.725 1464	+1587	-0.312 4971	-0.314 5547	+ 711
	16	-0.586 9882	-0.579 8989	2308	-0.729 8350	-0.734 4673	+1554	-0.316 5880	-0.318 5970	+ 696

## GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1917.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1917.0.
	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.	Noon.	Midnight.	Noon.
Nov. 16	-0.586 9882	-0.579 8989	-2308	-0.729 8350	-0.734 4673	+1554	-0.316 5880	-0.318 5970	+696
17	0.572 7652	0.565 5875	2343	0.739 0429	0.743 5615	1521	0.320 5814	0.322 5410	680
18	0.558 3665	0.551 1028	2378	0.748 0226	0.752 4261	1487	0.324 4758	0.326 3856	664
19	0.543 7969	0.536 4495	2412	0.756 7717	0.761 0588	1452	0.328 2702	0.330 1294	648
20	0.529 0611	0.521 6325	2445	0.765 2871	0.769 4563	1416	0.331 9631	0.333 7713	632
21	-0.514 1641	-0.506 6566	-2478	-0.773 5662	-0.777 6165	+1380	-0.335 5538	-0.337 3105	+615
22	0.499 1105	0.491 5265	2510	0.781 6068	0.785 5369	1343	0.339 0412	0.340 7458	598
23	0.483 9051	0.476 2469	2542	0.789 4065	0.793 2153	1306	0.342 4242	0.344 0762	581
24	0.468 5526	0.460 8226	2573	0.796 9631	0.800 6495	1268	0.345 7018	0.347 3009	564
25	0.453 0575	0.445 2580	2604	0.804 2742	0.807 8372	1230	0.348 8733	0.350 4189	546
26	-0.437 4246	-0.429 5578	-2634	-0.811 3382	-0.814 7769	+1191	-0.351 9376	-0.353 4294	+528
27	0.421 6583	0.413 7267	2664	0.818 1530	0.821 4664	1152	0.354 8941	0.356 3316	510
28	0.405 7635	0.397 7692	2693	0.824 7169	0.827 9042	1112	0.357 7418	0.359 1245	491
29	0.389 7442	0.381 6892	2721	0.831 0279	0.834 0878	1071	0.360 4797	0.361 8074	472
30	0.373 6049	0.365 4918	2748	0.837 0836	0.840 0153	1030	0.363 1073	0.364 3793	453
Dec. 1	-0.357 3505	-0.349 1816	-2775	-0.842 8826	-0.845 6851	+ 983	-0.365 6233	-0.366 8392	+434
2	0.340 9854	0.332 7626	2801	0.848 4226	0.851 0949	946	0.368 0269	0.369 1863	415
3	0.324 5140	0.316 2402	2826	0.853 7018	0.856 2430	903	0.370 3173	0.371 4199	395
4	0.307 9416	0.299 6188	2851	0.858 7183	0.861 1273	860	0.372 4938	0.373 5389	375
5	0.291 2725	0.282 9034	2875	0.863 4699	0.865 7460	816	0.374 5552	0.375 5426	355
6	-0.274 5122	-0.266 0994	-2898	-0.867 9552	-0.870 0974	+ 771	-0.376 5010	-0.377 4302	+335
7	0.257 6656	0.249 2114	2921	0.872 1723	0.874 1796	726	0.378 3302	0.379 2009	315
8	0.240 7376	0.232 2448	2942	0.876 1193	0.877 9911	681	0.380 0422	0.380 8541	294
9	0.223 7336	0.215 2047	2963	0.879 7949	0.881 5305	635	0.381 6364	0.382 3890	273
10	0.206 6588	0.198 0965	2983	0.883 1976	0.884 7961	589	0.383 1119	0.383 8051	252
11	-0.189 5186	-0.180 9257	-3002	-0.886 3258	-0.887 7864	+ 542	-0.384 4684	-0.385 1017	+231
12	0.172 3185	0.163 6977	3020	0.889 1779	0.890 5002	495	0.385 7050	0.386 2783	210
13	0.155 0640	0.146 4181	3037	0.891 7531	0.892 9365	447	0.386 8214	0.387 3343	183
14	0.137 7608	0.129 0928	3053	0.894 0503	0.895 0944	399	0.387 8170	0.388 2694	166
15	0.120 4148	0.111 7274	3069	0.896 0687	0.896 9729	350	0.388 6915	0.389 0833	144
16	-0.103 0314	-0.094 3277	-3084	-0.897 8070	-0.898 5710	+ 301	-0.389 4448	-0.389 7758	+122
17	0.085 6168	0.076 8995	3098	0.899 2648	0.899 8884	252	0.390 0764	0.390 3467	100
18	0.068 1766	0.059 4488	3111	0.900 4419	0.900 9252	202	0.390 5865	0.390 7958	78
19	0.050 7167	0.041 9810	3123	0.901 3383	0.901 6811	152	0.390 9747	0.391 1232	55
20	0.033 2425	0.024 5018	3134	0.901 9536	0.902 1560	101	0.391 2413	0.391 3290	33
21	-0.015 7597	-0.007 0168	-3144	-0.902 2882	-0.902 3504	+ 50	-0.391 3863	-0.391 4133	+ 10
22	+0.001 7263	+0.010 4688	3153	0.902 3424	0.902 2643	- 1	0.391 4099	0.391 3761	- 12
23	0.019 2101	0.027 9495	3161	0.902 1162	0.901 8983	52	0.391 3119	0.391 2175	35
24	0.036 6864	0.045 4202	3168	0.901 6104	0.901 2525	104	0.391 0928	0.390 9378	58
25	0.054 1501	0.062 8756	3174	0.900 8249	0.900 3274	156	0.390 7525	0.390 5370	81
26	+0.071 5960	+0.080 3106	-3179	-0.899 7602	-0.899 1234	- 208	-0.390 2913	-0.390 0154	-104
27	0.089 0189	0.097 7203	3183	0.898 4170	0.897 6410	260	0.389 7093	0.389 3730	127
28	0.106 4141	0.115 0997	3186	0.896 7956	0.895 8809	313	0.389 0065	0.388 6100	150
29	0.123 7764	0.132 4436	3188	0.894 8969	0.893 8434	366	0.388 1835	0.387 7269	173
30	0.141 1006	0.149 7469	3190	0.892 7205	0.891 5286	419	0.387 2403	0.386 7236	196
31	+0.158 3817	+0.167 0045	-3189	-0.890 2678	-0.888 9379	- 472	-0.386 1769	-0.385 6002	-220
32	+0.175 6146	+0.184 2114	-3188	-0.887 5389	-0.886 0710	- 526	-0.384 9935	-0.384 3570	-243

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 1.					JANUARY 3.				
	<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>"</i>		<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>"</i>
0	1 16 27.05	2.0961	+13 47 14.9	+12.285	0	2 59 24.21	2.1993	+21 50 52.4	+7.576
1	1 18 32.87	2.0978	13 59 29.7	12.207	1	3 1 36.24	2.2015	21 58 23.5	7.460
2	1 20 38.78	2.0993	14 11 39.7	12.126	2	3 3 48.39	2.2037	22 5 47.6	7.344
3	1 22 44.79	2.1010	14 23 44.8	12.045	3	3 6 0.68	2.2059	22 13 4.8	7.228
4	1 24 50.90	2.1027	14 35 45.1	11.963	4	3 8 13.10	2.2081	22 20 15.0	7.111
5	1 26 57.11	2.1043	14 47 40.3	11.879	5	3 10 25.65	2.2103	22 27 18.1	6.993
6	1 29 3.42	2.1062	14 59 30.6	11.796	6	3 12 38.33	2.2123	22 34 14.2	6.875
7	1 31 9.85	2.1080	15 11 15.8	11.712	7	3 14 51.13	2.2144	22 41 3.1	6.756
8	1 33 16.38	2.1098	15 22 56.0	11.626	8	3 17 4.06	2.2165	22 47 44.9	6.637
9	1 35 23.03	2.1118	15 34 30.9	11.539	9	3 19 17.11	2.2185	22 54 19.5	6.517
10	1 37 29.79	2.1136	15 46 0.7	11.453	10	3 21 30.28	2.2205	23 0 46.9	6.397
11	1 39 36.66	2.1155	15 57 25.2	11.364	11	3 23 43.57	2.2224	23 7 7.1	6.276
12	1 41 43.65	2.1175	16 8 44.4	11.275	12	3 25 56.97	2.2243	23 13 20.0	6.154
13	1 43 50.76	2.1196	16 19 58.2	11.186	13	3 28 10.49	2.2263	23 19 25.6	6.033
14	1 45 58.00	2.1216	16 31 6.7	11.096	14	3 30 24.12	2.2281	23 25 23.9	5.911
15	1 48 5.35	2.1236	16 42 9.7	11.004	15	3 32 37.86	2.2299	23 31 14.9	5.788
16	1 50 12.83	2.1258	16 53 7.2	10.913	16	3 34 51.71	2.2317	23 36 58.5	5.665
17	1 52 20.44	2.1279	17 3 59.2	10.819	17	3 37 5.66	2.2334	23 42 34.7	5.541
18	1 54 28.18	2.1301	17 14 45.5	10.725	18	3 39 19.72	2.2351	23 48 3.4	5.417
19	1 56 36.05	2.1322	17 25 26.2	10.632	19	3 41 33.87	2.2367	23 53 24.7	5.293
20	1 58 44.04	2.1343	17 36 1.3	10.537	20	3 43 48.12	2.2383	23 58 38.5	5.168
21	2 0 52.17	2.1367	17 46 30.6	10.441	21	3 46 2.46	2.2398	24 3 44.8	5.042
22	2 3 0.44	2.1388	17 56 54.2	10.344	22	3 48 16.89	2.2413	24 8 43.5	4.917
23	2 5 8.83	2.1411	+18 7 11.9	+10.246	23	3 50 31.41	2.2428	+24 13 34.8	+4.791
JANUARY 2.					JANUARY 4.				
0	2 7 17.37	2.1434	+18 17 23.7	+10.148	0	3 52 46.02	2.2442	+24 18 18.4	+4.664
1	2 9 26.04	2.1457	18 27 29.6	10.049	1	3 55 0.71	2.2455	24 22 54.5	4.538
2	2 11 34.85	2.1480	18 37 29.6	9.949	2	3 57 15.48	2.2468	24 27 22.9	4.410
3	2 13 43.80	2.1503	18 47 23.5	9.848	3	3 59 30.32	2.2479	24 31 43.7	4.283
4	2 15 52.89	2.1527	18 57 11.4	9.748	4	4 1 45.23	2.2492	24 35 56.9	4.155
5	2 18 2.12	2.1549	19 6 53.2	9.646	5	4 4 0.22	2.2503	24 40 2.3	4.027
6	2 20 11.48	2.1573	19 16 28.9	9.543	6	4 6 15.26	2.2513	24 44 0.1	3.899
7	2 22 20.99	2.1597	19 25 58.4	9.439	7	4 8 30.37	2.2523	24 47 50.2	3.771
8	2 24 30.64	2.1620	19 35 21.6	9.335	8	4 10 45.54	2.2533	24 51 32.6	3.642
9	2 26 40.43	2.1643	19 44 38.6	9.230	9	4 13 0.76	2.2541	24 55 7.2	3.513
10	2 28 50.36	2.1667	19 53 49.2	9.125	10	4 15 16.03	2.2549	24 58 34.1	3.384
11	2 31 0.43	2.1691	20 2 53.6	9.018	11	4 17 31.35	2.2556	25 1 53.3	3.254
12	2 33 10.65	2.1715	20 11 51.4	8.911	12	4 19 46.70	2.2563	25 5 4.6	3.124
13	2 35 21.01	2.1738	20 20 42.9	8.803	13	4 22 2.10	2.2569	25 8 8.2	2.994
14	2 37 31.51	2.1762	20 29 27.8	8.695	14	4 24 17.53	2.2575	25 11 3.9	2.864
15	2 39 42.15	2.1786	20 38 6.3	8.587	15	4 26 33.00	2.2581	25 13 51.9	2.734
16	2 41 52.94	2.1809	20 46 38.2	8.477	16	4 28 48.50	2.2584	25 16 32.0	2.603
17	2 44 3.86	2.1832	20 55 3.5	8.366	17	4 31 4.01	2.2588	25 19 4.3	2.473
18	2 46 14.92	2.1856	21 3 22.1	8.255	18	4 33 19.55	2.2591	25 21 28.8	2.343
19	2 48 26.13	2.1879	21 11 34.1	8.144	19	4 35 35.10	2.2593	25 23 45.5	2.213
20	2 50 37.47	2.1902	21 19 39.4	8.032	20	4 37 50.67	2.2595	25 25 54.3	2.082
21	2 52 48.95	2.1925	21 27 37.9	7.918	21	4 40 6.24	2.2595	25 27 55.3	1.952
22	2 55 0.57	2.1948	21 35 29.6	7.804	22	4 42 21.81	2.2596	25 29 48.5	1.821
23	2 57 12.32	2.1970	21 43 14.4	7.690	23	4 44 37.39	2.2595	25 31 33.8	1.689
24	2 59 24.21	2.1993	+21 50 52.4	+7.576	24	4 46 52.95	2.2593	+25 33 11.2	+1.558

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 5.					JANUARY 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	4 46 52.95	2.2593	+25 33 11.2	+1.538	0	6 33 49.86	2.1715	+24 20 31.0	-4.453
1	4 49 8.51	2.2592	25 34 40.8	1.428	1	6 36 0.05	2.1682	24 16 0.4	4.563
2	4 51 24.05	2.2588	25 36 2.5	1.297	2	6 38 10.04	2.1649	24 11 22.9	4.681
3	4 53 39.57	2.2586	25 37 16.4	1.166	3	6 40 19.84	2.1615	24 6 38.7	4.793
4	4 55 55.08	2.2582	25 38 22.4	1.035	4	6 42 29.42	2.1581	24 1 47.7	4.906
5	4 58 10.55	2.2576	25 39 20.6	0.905	5	6 44 38.81	2.1547	23 56 50.0	5.018
6	5 0 25.99	2.2571	25 40 11.0	0.774	6	6 46 47.98	2.1511	23 51 45.6	5.123
7	5 2 41.40	2.2564	25 40 53.5	0.643	7	6 48 56.94	2.1476	23 46 34.6	5.233
8	5 4 56.76	2.2557	25 41 28.2	0.513	8	6 51 5.69	2.1440	23 41 17.0	5.348
9	5 7 12.08	2.2549	25 41 55.1	0.383	9	6 53 14.22	2.1404	23 35 52.8	5.457
10	5 9 27.35	2.2541	25 42 14.1	0.253	10	6 55 22.54	2.1368	23 30 22.2	5.564
11	5 11 42.57	2.2532	25 42 25.4	+0.123	11	6 57 30.64	2.1331	23 24 45.1	5.672
12	5 13 57.73	2.2522	25 42 28.8	-0.008	12	6 59 38.51	2.1294	23 19 1.6	5.773
13	5 16 12.83	2.2511	25 42 24.5	0.138	13	7 1 46.17	2.1258	23 13 11.7	5.884
14	5 18 27.86	2.2498	25 42 12.3	0.267	14	7 3 53.60	2.1219	23 7 15.5	5.989
15	5 20 42.81	2.2487	25 41 52.5	0.396	15	7 6 0.80	2.1182	23 1 13.0	6.093
16	5 22 57.70	2.2474	25 41 24.8	0.525	16	7 8 7.78	2.1144	22 55 4.3	6.198
17	5 25 12.50	2.2460	25 40 49.5	0.653	17	7 10 14.53	2.1105	22 48 49.3	6.301
18	5 27 27.22	2.2446	25 40 6.4	0.783	18	7 12 21.04	2.1067	22 42 28.2	6.402
19	5 29 41.85	2.2431	25 39 15.6	0.911	19	7 14 27.33	2.1028	22 36 1.1	6.503
20	5 31 56.39	2.2415	25 38 17.1	1.038	20	7 16 33.38	2.0989	22 29 27.8	6.604
21	5 34 10.83	2.2398	25 37 11.0	1.166	21	7 18 39.20	2.0951	22 22 48.6	6.704
22	5 36 25.17	2.2382	25 35 57.2	1.293	22	7 20 44.79	2.0912	22 16 3.3	6.803
23	5 38 39.41	2.2364	+25 34 35.8	-1.421	23	7 22 50.14	2.0872	+22 9 12.2	-6.901
JANUARY 6.					JANUARY 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	5 40 53.54	2.2345	+25 33 6.7	-1.548	0	7 24 55.25	2.0833	+22 2 15.2	-6.993
1	5 43 7.55	2.2326	25 31 30.1	1.674	1	7 27 0.13	2.0793	21 55 12.4	7.095
2	5 45 21.45	2.2307	25 29 45.8	1.800	2	7 29 4.76	2.0753	21 48 3.8	7.192
3	5 47 35.23	2.2286	25 27 54.1	1.926	3	7 31 9.16	2.0713	21 40 49.4	7.287
4	5 49 48.88	2.2264	25 25 54.7	2.052	4	7 33 13.31	2.0673	21 33 29.4	7.380
5	5 52 2.40	2.2243	25 23 47.9	2.175	5	7 35 17.23	2.0633	21 26 3.8	7.473
6	5 54 15.79	2.2220	25 21 33.7	2.300	6	7 37 20.91	2.0593	21 18 32.6	7.567
7	5 56 29.04	2.2197	25 19 11.9	2.424	7	7 39 24.34	2.0553	21 10 55.8	7.653
8	5 58 42.15	2.2173	25 16 42.8	2.548	8	7 41 27.54	2.0513	21 3 13.6	7.749
9	6 0 55.11	2.2148	25 14 6.2	2.671	9	7 43 30.49	2.0473	20 55 25.9	7.840
10	6 3 7.93	2.2124	25 11 22.3	2.793	10	7 45 33.21	2.0433	20 47 32.8	7.929
11	6 5 20.60	2.2098	25 8 31.0	2.916	11	7 47 35.68	2.0392	20 39 34.4	8.017
12	6 7 33.10	2.2071	25 5 32.4	3.037	12	7 49 37.91	2.0352	20 31 30.8	8.104
13	6 9 45.45	2.2045	25 2 26.6	3.158	13	7 51 39.90	2.0312	20 23 21.9	8.192
14	6 11 57.64	2.2018	24 59 13.5	3.279	14	7 53 41.65	2.0272	20 15 7.8	8.273
15	6 14 9.66	2.1989	24 55 53.1	3.399	15	7 55 43.16	2.0231	20 6 48.5	8.364
16	6 16 21.51	2.1961	24 52 25.6	3.518	16	7 57 44.42	2.0191	19 58 24.1	8.443
17	6 18 33.19	2.1932	24 48 51.0	3.637	17	7 59 45.45	2.0152	19 49 54.7	8.532
18	6 20 44.69	2.1903	24 45 9.2	3.755	18	8 1 46.24	2.0112	19 41 20.3	8.614
19	6 22 56.02	2.1873	24 41 20.4	3.873	19	8 3 46.79	2.0072	19 32 41.0	8.697
20	6 25 7.16	2.1842	24 37 24.5	3.991	20	8 5 47.10	2.0032	19 23 56.7	8.775
21	6 27 18.12	2.1811	24 33 21.5	4.108	21	8 7 47.17	1.9993	19 15 7.7	8.853
22	6 29 28.89	2.1779	24 29 11.6	4.223	22	8 9 47.01	1.9953	19 6 13.8	8.933
23	6 31 39.47	2.1748	24 24 54.7	4.338	23	8 11 46.61	1.9914	18 57 15.2	9.016
24	6 33 49.86	2.1715	+24 20 31.0	-4.453	24	8 13 45.98	1.9875	+18 48 11.9	-9.094

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 9.					JANUARY 11.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	8 13 45.98	1.9875	+18 48 11.9	-9.094	0	9 45 11.23	1.8361	+10 17 22.6	-11.890
1	8 15 45.11	1.9837	18 39 3.9	9.171	1	9 47 1.33	1.8340	10 5 28.0	11.929
2	8 17 44.02	1.9798	18 29 51.4	9.247	2	9 48 51.31	1.8320	9 53 31.1	11.968
3	8 19 42.69	1.9759	18 20 34.3	9.323	3	9 50 41.17	1.8300	9 41 31.9	12.006
4	8 21 41.13	1.9721	18 11 12.7	9.397	4	9 52 30.91	1.8280	9 29 30.4	12.044
5	8 23 39.34	1.9683	18 1 46.7	9.471	5	9 54 20.53	1.8261	9 17 26.6	12.081
6	8 25 37.32	1.9644	17 52 16.2	9.544	6	9 56 10.04	1.8243	9 5 20.7	12.116
7	8 27 35.07	1.9607	17 42 41.4	9.616	7	9 57 59.45	1.8226	8 53 12.7	12.152
8	8 29 32.60	1.9570	17 33 2.3	9.687	8	9 59 48.75	1.8208	8 41 2.5	12.187
9	8 31 29.91	1.9533	17 23 19.0	9.758	9	10 1 37.95	1.8192	8 28 50.3	12.221
10	8 33 26.99	1.9495	17 13 31.4	9.828	10	10 3 27.05	1.8176	8 16 36.0	12.254
11	8 35 23.85	1.9458	17 3 39.7	9.895	11	10 5 16.06	1.8161	8 4 19.8	12.286
12	8 37 20.49	1.9422	16 53 44.0	9.963	12	10 7 4.98	1.8146	7 52 1.7	12.318
13	8 39 16.91	1.9386	16 43 44.1	10.031	13	10 8 53.81	1.8131	7 39 41.7	12.349
14	8 41 13.12	1.9350	16 33 40.3	10.098	14	10 10 42.55	1.8118	7 27 19.8	12.380
15	8 43 9.11	1.9314	16 23 32.4	10.163	15	10 12 31.22	1.8104	7 14 56.1	12.409
16	8 45 4.89	1.9279	16 13 20.7	10.228	16	10 14 19.80	1.8092	7 2 30.7	12.438
17	8 47 0.46	1.9244	16 3 5.1	10.293	17	10 16 8.32	1.8080	6 50 3.5	12.467
18	8 48 55.82	1.9210	15 52 45.6	10.355	18	10 17 56.76	1.8068	6 37 34.7	12.494
19	8 50 50.98	1.9176	15 42 22.5	10.417	19	10 19 45.14	1.8058	6 25 4.2	12.522
20	8 52 45.93	1.9142	15 31 55.6	10.479	20	10 21 33.45	1.8047	6 12 32.1	12.548
21	8 54 40.68	1.9108	15 21 25.0	10.540	21	10 23 21.70	1.8038	5 59 58.4	12.573
22	8 56 35.23	1.9075	15 10 50.8	10.600	22	10 25 9.90	1.8029	5 47 23.3	12.598
23	8 58 29.58	1.9042	+15 0 13.0	-10.658	23	10 26 58.05	1.8021	+ 5 34 46.6	-12.623
JANUARY 10.					JANUARY 12.				
0	9 0 23.73	1.9009	+14 49 31.8	-10.717	0	10 28 46.15	1.8013	+ 5 22 8.5	-12.647
1	9 2 17.69	1.8978	14 38 47.0	10.775	1	10 30 34.21	1.8006	5 9 29.0	12.670
2	9 4 11.46	1.8946	14 27 58.8	10.832	2	10 32 22.22	1.7999	4 56 48.1	12.692
3	9 6 5.04	1.8915	14 17 7.2	10.888	3	10 34 10.20	1.7993	4 44 6.0	12.713
4	9 7 58.44	1.8884	14 6 12.3	10.943	4	10 35 58.14	1.7988	4 31 22.5	12.735
5	9 9 51.65	1.8853	13 55 14.0	10.998	5	10 37 46.06	1.7984	4 18 37.8	12.755
6	9 11 44.68	1.8823	13 44 12.6	11.051	6	10 39 33.95	1.7979	4 5 51.9	12.774
7	9 13 37.53	1.8793	13 33 7.9	11.105	7	10 41 21.81	1.7976	3 53 4.9	12.793
8	9 15 30.20	1.8764	13 22 0.0	11.157	8	10 43 9.66	1.7974	3 40 16.7	12.812
9	9 17 22.70	1.8736	13 10 49.1	11.208	9	10 44 57.50	1.7972	3 27 27.5	12.829
10	9 19 15.03	1.8708	12 59 35.1	11.258	10	10 46 45.32	1.7970	3 14 37.2	12.847
11	9 21 7.19	1.8680	12 48 18.1	11.308	11	10 48 33.14	1.7969	3 1 45.9	12.863
12	9 22 59.19	1.8653	12 36 58.1	11.358	12	10 50 20.95	1.7969	2 48 53.7	12.878
13	9 24 51.02	1.8626	12 25 35.2	11.406	13	10 52 8.77	1.7970	2 36 0.6	12.893
14	9 26 42.70	1.8599	12 14 9.4	11.454	14	10 53 56.59	1.7971	2 23 6.5	12.908
15	9 28 34.21	1.8573	12 2 40.7	11.501	15	10 55 44.42	1.7973	2 10 11.7	12.921
16	9 30 25.57	1.8548	11 51 9.3	11.547	16	10 57 32.27	1.7976	1 57 16.0	12.934
17	9 32 16.78	1.8523	11 39 35.1	11.593	17	10 59 20.13	1.7979	1 44 19.6	12.946
18	9 34 7.84	1.8498	11 27 58.2	11.637	18	11 1 8.02	1.7983	1 31 22.5	12.958
19	9 35 58.75	1.8473	11 16 18.7	11.681	19	11 2 55.93	1.7988	1 18 24.7	12.969
20	9 37 49.52	1.8450	11 4 36.5	11.724	20	11 4 43.87	1.7993	1 5 26.2	12.979
21	9 39 40.15	1.8427	10 52 51.8	11.767	21	11 6 31.84	1.7999	0 52 27.2	12.988
22	9 41 30.64	1.8404	10 41 4.5	11.808	22	11 8 19.86	1.8006	0 39 27.6	12.998
23	9 43 21.00	1.8383	10 29 14.8	11.849	23	11 10 7.91	1.8013	0 26 27.5	13.006
24	9 45 11.23	1.8361	+10 17 22.6	-11.890	24	11 11 56.01	1.8021	+ 0 13 26.9	-13.014

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 13.					JANUARY 15.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	11 11 56.01	1.8021	+ 0 13 26.9	-13.014	0	12 40 43.09	1.9257	-10 6 24.1	-12.520
1	11 13 44.16	1.8030	+ 0 0 25.8	13.021	1	12 42 38.76	1.9301	10 18 54.4	12.490
2	11 15 32.37	1.8039	- 0 12 35.6	13.027	2	12 44 34.70	1.9346	10 31 22.9	12.458
3	11 17 20.63	1.8049	0 25 37.4	13.033	3	12 46 30.91	1.9392	10 43 49.4	12.426
4	11 19 8.96	1.8060	0 38 39.5	13.037	4	12 48 27.40	1.9438	10 56 14.0	12.393
5	11 20 57.35	1.8072	0 51 41.8	13.041	5	12 50 24.16	1.9484	11 8 36.6	12.359
6	11 22 45.82	1.8083	1 4 44.4	13.045	6	12 52 21.21	1.9533	11 20 57.1	12.324
7	11 24 34.35	1.8096	1 17 47.2	13.048	7	12 54 18.55	1.9582	11 33 15.5	12.288
8	11 26 22.97	1.8110	1 30 50.1	13.049	8	12 56 16.19	1.9631	11 45 31.7	12.252
9	11 28 11.67	1.8124	1 43 53.1	13.051	9	12 58 14.12	1.9680	11 57 45.7	12.214
10	11 30 0.46	1.8140	1 56 56.2	13.052	10	13 0 12.35	1.9732	12 9 57.4	12.174
11	11 31 49.35	1.8155	2 9 59.3	13.051	11	13 2 10.90	1.9783	12 22 6.6	12.133
12	11 33 38.32	1.8171	2 23 2.3	13.050	12	13 4 9.75	1.9835	12 34 13.4	12.093
13	11 35 27.40	1.8188	2 36 5.3	13.049	13	13 6 8.92	1.9888	12 46 17.8	12.051
14	11 37 16.58	1.8207	2 49 8.2	13.048	14	13 8 8.41	1.9943	12 58 19.5	12.008
15	11 39 5.88	1.8226	3 2 11.0	13.045	15	13 10 8.23	1.9997	13 10 18.7	11.964
16	11 40 55.29	1.8244	3 15 13.6	13.041	16	13 12 8.37	2.0052	13 22 15.2	11.918
17	11 42 44.81	1.8264	3 28 15.9	13.037	17	13 14 8.85	2.0108	13 34 8.9	11.872
18	11 44 34.46	1.8286	3 41 18.0	13.032	18	13 16 9.67	2.0164	13 45 59.8	11.824
19	11 46 24.24	1.8308	3 54 19.7	13.026	19	13 18 10.82	2.0222	13 57 47.8	11.776
20	11 48 14.15	1.8329	4 7 21.1	13.019	20	13 20 12.33	2.0280	14 9 32.9	11.727
21	11 50 4.19	1.8353	4 20 22.0	13.012	21	13 22 14.18	2.0338	14 21 15.0	11.676
22	11 51 54.38	1.8376	4 33 22.5	13.004	22	13 24 16.39	2.0398	14 32 54.0	11.623
23	11 53 44.70	1.8400	- 4 46 22.5	-12.996	23	13 26 18.95	2.0458	-14 44 29.8	-11.570
JANUARY 14.					JANUARY 16.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	11 55 35.18	1.8426	- 4 59 22.0	-12.987	0	13 28 21.88	2.0519	-14 56 2.4	-11.516
1	11 57 25.81	1.8452	5 12 20.9	12.976	1	13 30 25.18	2.0581	15 7 31.7	11.461
2	11 59 16.60	1.8478	5 25 19.1	12.965	2	13 32 28.85	2.0643	15 18 57.7	11.404
3	12 1 7.55	1.8506	5 38 16.7	12.953	3	13 34 32.89	2.0705	15 30 20.2	11.346
4	12 2 58.67	1.8534	5 51 13.5	12.941	4	13 36 37.31	2.0769	15 41 39.2	11.287
5	12 4 49.96	1.8563	6 4 9.6	12.928	5	13 38 42.12	2.0833	15 52 54.6	11.227
6	12 6 41.42	1.8593	6 17 4.9	12.914	6	13 40 47.31	2.0898	16 4 6.4	11.165
7	12 8 33.07	1.8623	6 29 59.3	12.898	7	13 42 52.89	2.0963	16 15 14.4	11.103
8	12 10 24.90	1.8655	6 42 52.7	12.883	8	13 44 58.87	2.1030	16 26 18.7	11.039
9	12 12 16.93	1.8687	6 55 45.3	12.868	9	13 47 5.25	2.1096	16 37 19.1	10.973
10	12 14 9.14	1.8719	7 8 36.8	12.849	10	13 49 12.02	2.1163	16 48 15.5	10.907
11	12 16 1.56	1.8753	7 21 27.2	12.832	11	13 51 19.20	2.1231	16 59 7.9	10.839
12	12 17 54.18	1.8788	7 34 16.6	12.813	12	13 53 26.79	2.1299	17 9 56.2	10.770
13	12 19 47.01	1.8822	7 47 4.8	12.793	13	13 55 34.79	2.1368	17 20 40.3	10.699
14	12 21 40.04	1.8858	7 59 51.8	12.773	14	13 57 43.21	2.1438	17 31 20.1	10.628
15	12 23 33.30	1.8894	8 12 37.5	12.752	15	13 59 52.04	2.1508	17 41 55.6	10.554
16	12 25 26.77	1.8932	8 25 22.0	12.729	16	14 2 1.90	2.1578	17 52 26.6	10.479
17	12 27 20.48	1.8970	8 38 5.0	12.706	17	14 4 10.98	2.1649	18 2 53.1	10.403
18	12 29 14.41	1.9008	8 50 46.7	12.683	18	14 6 21.09	2.1721	18 13 15.0	10.327
19	12 31 8.57	1.9048	9 3 26.9	12.658	19	14 8 31.63	2.1793	18 23 32.3	10.248
20	12 33 2.98	1.9088	9 16 5.6	12.632	20	14 10 42.61	2.1866	18 33 44.7	10.168
21	12 34 57.63	1.9129	9 28 42.7	12.605	21	14 12 54.02	2.1938	18 43 52.4	10.087
22	12 36 52.53	1.9171	9 41 18.2	12.578	22	14 15 5.87	2.2012	18 53 55.1	10.003
23	12 38 47.68	1.9213	9 53 52.0	12.549	23	14 17 18.16	2.2086	19 3 52.8	9.919
24	12 40 43.09	1.9257	- 10 6 24.1	-12.520	24	14 19 30.90	2.2160	-19 13 45.4	-9.833



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 17.					JANUARY 19.				
	h m s		° ' "	"		h m s		° ' "	"
0	14 19 30.90	2.2160	-19 13 45.4	-9.833	0	16 14 41.34	2.5749	-24 57 45.8	-3.899
1	14 21 44.08	2.2235	19 23 32.8	9.746	1	16 17 16.03	2.5813	25 1 35.0	3.738
2	14 23 57.72	2.2310	19 33 14.9	9.658	2	16 19 51.10	2.5876	25 5 14.4	3.575
3	14 26 11.80	2.2385	19 42 51.7	9.568	3	16 22 26.54	2.5937	25 8 44.0	3.412
4	14 28 26.34	2.2461	19 52 23.0	9.475	4	16 25 2.34	2.5997	25 12 3.8	3.247
5	14 30 41.33	2.2538	20 1 48.7	9.382	5	16 27 38.50	2.6056	25 15 13.6	3.080
6	14 32 56.79	2.2614	20 11 8.8	9.288	6	16 30 15.01	2.6113	25 18 13.4	2.913
7	14 35 12.70	2.2690	20 20 23.2	9.192	7	16 32 51.86	2.6170	25 21 3.1	2.743
8	14 37 29.07	2.2767	20 29 31.8	9.093	8	16 35 29.05	2.6226	25 23 42.6	2.573
9	14 39 45.90	2.2844	20 38 34.4	8.994	9	16 38 6.57	2.6280	25 26 11.9	2.403
10	14 42 3.20	2.2922	20 47 31.1	8.894	10	16 40 44.41	2.6333	25 28 30.9	2.230
11	14 44 20.96	2.2998	20 56 21.7	8.792	11	16 43 22.57	2.6385	25 30 39.5	2.056
12	14 46 39.18	2.3076	21 5 6.1	8.688	12	16 46 1.03	2.6435	25 32 37.6	1.881
13	14 48 57.87	2.3154	21 13 44.2	8.583	13	16 48 39.79	2.6484	25 34 25.2	1.705
14	14 51 17.03	2.3233	21 22 16.0	8.476	14	16 51 18.84	2.6533	25 36 2.2	1.528
15	14 53 36.66	2.3311	21 30 41.3	8.367	15	16 53 58.18	2.6578	25 37 28.6	1.351
16	14 55 56.76	2.3389	21 39 0.0	8.257	16	16 56 37.78	2.6623	25 38 44.3	1.172
17	14 58 17.33	2.3468	21 47 12.1	8.145	17	16 59 17.65	2.6666	25 39 49.2	0.992
18	15 0 38.37	2.3545	21 55 17.4	8.032	18	17 1 57.77	2.6708	25 40 43.3	0.812
19	15 2 59.87	2.3623	22 3 15.9	7.917	19	17 4 38.14	2.6748	25 41 26.6	0.630
20	15 5 21.85	2.3702	22 11 7.4	7.800	20	17 7 18.74	2.6787	25 41 58.9	0.447
21	15 7 44.29	2.3779	22 18 51.9	7.683	21	17 9 59.58	2.6824	25 42 20.2	0.263
22	15 10 7.20	2.3858	22 26 29.3	7.563	22	17 12 40.63	2.6858	25 42 30.5	-0.080
23	15 12 30.58	2.3936	-22 33 59.4	-7.441	23	17 15 21.88	2.6893	-25 42 29.8	+0.105
JANUARY 18.					JANUARY 20.				
	h m s		° ' "	"		h m s		° ' "	"
0	15 14 54.43	2.4013	-22 41 22.2	-7.318	0	17 18 3.34	2.6926	-25 42 17.9	+0.291
1	15 17 18.74	2.4091	22 48 37.6	7.194	1	17 20 44.99	2.6987	25 41 54.9	0.477
2	15 19 43.52	2.4168	22 55 45.5	7.068	2	17 23 26.82	2.6985	25 41 20.7	0.663
3	15 22 8.76	2.4246	23 2 45.8	6.941	3	17 26 8.81	2.7013	25 40 35.3	0.851
4	15 24 34.47	2.4323	23 9 38.4	6.811	4	17 28 50.97	2.7038	25 39 38.6	1.038
5	15 27 0.63	2.4398	23 16 23.1	6.680	5	17 31 33.27	2.7063	25 38 30.7	1.226
6	15 29 27.25	2.4474	23 23 0.0	6.548	6	17 34 15.72	2.7085	25 37 11.5	1.415
7	15 31 54.32	2.4550	23 29 28.9	6.413	7	17 36 58.29	2.7105	25 35 40.9	1.604
8	15 34 21.85	2.4626	23 35 49.6	6.278	8	17 39 40.98	2.7123	25 33 59.0	1.793
9	15 36 49.83	2.4701	23 42 2.2	6.142	9	17 42 23.77	2.7141	25 32 5.7	1.983
10	15 39 18.26	2.4776	23 48 6.6	6.003	10	17 45 6.67	2.7157	25 30 1.0	2.173
11	15 41 47.14	2.4849	23 54 2.5	5.862	11	17 47 49.65	2.7169	25 27 45.0	2.363
12	15 44 16.45	2.4923	23 59 50.0	5.720	12	17 50 32.70	2.7181	25 25 17.5	2.553
13	15 46 46.21	2.4996	24 5 28.9	5.577	13	17 53 15.82	2.7192	25 22 38.6	2.743
14	15 49 16.40	2.5068	24 10 59.2	5.432	14	17 55 59.00	2.7201	25 19 48.3	2.933
15	15 51 47.02	2.5140	24 16 20.7	5.285	15	17 58 42.23	2.7208	25 16 46.6	3.123
16	15 54 18.08	2.5211	24 21 33.4	5.137	16	18 1 25.49	2.7212	25 13 33.5	3.314
17	15 56 49.55	2.5281	24 26 37.1	4.987	17	18 4 8.77	2.7215	25 10 8.9	3.504
18	15 59 21.45	2.5350	24 31 31.8	4.836	18	18 6 52.07	2.7217	25 6 33.0	3.694
19	16 1 53.75	2.5418	24 36 17.4	4.684	19	18 9 35.37	2.7216	25 2 45.6	3.884
20	16 4 26.47	2.5488	24 40 53.9	4.530	20	18 12 18.66	2.7214	24 58 46.9	4.073
21	16 6 59.60	2.5554	24 45 21.0	4.374	21	18 15 1.94	2.7211	24 54 36.8	4.263
22	16 9 33.12	2.5620	24 49 38.8	4.218	22	18 17 45.19	2.7205	24 50 15.3	4.453
23	16 12 7.04	2.5685	24 53 47.1	4.058	23	18 20 28.40	2.7198	24 45 42.5	4.641
24	16 14 41.34	2.5749	-24 57 45.8	-3.899	24	18 23 11.56	2.7189	-24 40 58.4	+4.829

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 21.					JANUARY 23.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	18 23 11.56	2.7189	-24 40 58.4	+ 4.829	0	20 30 2.67	2.5274	-17 30 59.1	+12.530
1	18 25 54.67	2.7178	24 36 3.0	5.017	1	20 32 34.14	2.5215	17 18 23.7	17.649
2	18 28 37.70	2.7166	24 30 56.4	5.204	2	20 35 5.25	2.5157	17 5 41.2	12.766
3	18 31 20.66	2.7153	24 25 38.5	5.392	3	20 37 36.02	2.5098	16 52 51.8	12.880
4	18 34 3.54	2.7138	24 20 9.4	5.578	4	20 40 6.43	2.5039	16 39 55.6	12.993
5	18 36 46.31	2.7120	24 14 29.2	5.763	5	20 42 36.49	2.4981	16 26 52.7	13.103
6	18 39 28.98	2.7102	24 8 37.9	5.947	6	20 45 6.20	2.4923	16 13 43.2	13.212
7	18 42 11.53	2.7082	24 2 35.6	6.131	7	20 47 35.56	2.4863	16 0 27.3	13.318
8	18 44 53.96	2.7060	23 56 22.2	6.314	8	20 50 4.56	2.4804	15 47 5.1	13.422
9	18 47 36.25	2.7037	23 49 57.9	6.496	9	20 52 33.21	2.4746	15 33 36.7	13.524
10	18 50 18.40	2.7013	23 43 22.7	6.678	10	20 55 1.51	2.4688	15 20 2.2	13.624
11	18 53 0.40	2.6987	23 36 36.6	6.858	11	20 57 29.46	2.4628	15 6 21.8	13.722
12	18 55 42.24	2.6969	23 29 39.7	7.038	12	20 59 57.05	2.4569	14 52 35.6	13.818
13	18 58 23.91	2.6929	23 22 32.1	7.216	13	21 2 24.29	2.4511	14 38 43.7	13.911
14	19 1 5.39	2.6899	23 15 13.8	7.394	14	21 4 51.18	2.4453	14 24 46.3	14.002
15	19 3 46.70	2.6868	23 7 44.8	7.570	15	21 7 17.73	2.4395	14 10 43.5	14.091
16	19 6 27.80	2.6834	23 0 5.4	7.745	16	21 9 43.92	2.4337	13 56 35.4	14.178
17	19 9 8.71	2.6800	22 52 15.4	7.919	17	21 12 9.77	2.4279	13 42 22.1	14.263
18	19 11 49.40	2.6764	22 44 15.1	8.091	18	21 14 35.27	2.4222	13 28 3.8	14.345
19	19 14 29.88	2.6728	22 36 4.5	8.263	19	21 17 0.43	2.4164	13 13 40.7	14.426
20	19 17 10.14	2.6690	22 27 43.6	8.433	20	21 19 25.24	2.4107	12 59 12.7	14.504
21	19 19 50.16	2.6651	22 19 12.5	8.602	21	21 21 49.71	2.4051	12 44 40.2	14.580
22	19 22 29.95	2.6611	22 10 31.4	8.769	22	21 24 13.85	2.3994	12 30 3.1	14.654
23	19 25 9.49	2.6568	-22 1 40.2	+ 8.935	23	21 26 37.64	2.3938	-12 15 21.7	+14.726
JANUARY 22.					JANUARY 24.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	19 27 48.77	2.6526	-21 52 39.2	+ 9.099	0	21 29 1.10	2.3883	-12 0 36.0	+14.796
1	19 30 27.80	2.6483	21 43 28.3	9.262	1	21 31 24.23	2.3828	11 45 46.2	14.863
2	19 33 6.56	2.6438	21 34 7.8	9.423	2	21 33 47.03	2.3773	11 30 52.4	14.928
3	19 35 45.05	2.6393	21 24 37.5	9.583	3	21 36 9.50	2.3718	11 15 54.8	14.991
4	19 38 23.27	2.6346	21 14 57.8	9.741	4	21 38 31.65	2.3664	11 0 53.5	15.053
5	19 41 1.20	2.6298	21 5 8.6	9.898	5	21 40 53.47	2.3610	10 45 48.5	15.112
6	19 43 38.85	2.6251	20 55 10.0	10.053	6	21 43 14.97	2.3558	10 30 40.1	15.168
7	19 46 16.21	2.6202	20 45 2.2	10.208	7	21 45 36.16	2.3505	10 15 28.3	15.223
8	19 48 53.27	2.6152	20 34 45.3	10.358	8	21 47 57.03	2.3453	10 0 13.3	15.277
9	19 51 30.03	2.6101	20 24 19.3	10.508	9	21 50 17.59	2.3401	9 44 55.1	15.327
10	19 54 6.48	2.6049	20 13 44.3	10.657	10	21 52 37.84	2.3350	9 29 34.1	15.375
11	19 56 42.62	2.5998	20 3 0.5	10.803	11	21 54 57.79	2.3299	9 14 10.1	15.422
12	19 59 18.45	2.5945	19 52 8.0	10.947	12	21 57 17.43	2.3249	8 58 43.5	15.466
13	20 1 53.96	2.5892	19 41 6.9	11.089	13	21 59 36.78	2.3200	8 43 14.2	15.509
14	20 4 29.15	2.5838	19 29 57.3	11.230	14	22 1 55.83	2.3151	8 27 42.4	15.549
15	20 7 4.01	2.5783	19 18 39.3	11.369	15	22 4 14.59	2.3103	8 12 8.3	15.587
16	20 9 38.54	2.5728	19 7 13.0	11.506	16	22 6 33.07	2.3056	7 56 32.0	15.623
17	20 12 12.74	2.5673	18 55 38.6	11.641	17	22 8 51.26	2.3008	7 40 53.5	15.658
18	20 14 46.61	2.5617	18 43 56.1	11.773	18	22 11 9.17	2.2962	7 25 13.0	15.690
19	20 17 20.14	2.5560	18 32 5.8	11.904	19	22 13 26.80	2.2916	7 9 30.7	15.720
20	20 19 53.33	2.5503	18 20 7.6	12.034	20	22 15 44.16	2.2871	6 53 46.6	15.748
21	20 22 26.18	2.5447	18 8 1.7	12.162	21	22 18 1.25	2.2827	6 38 0.9	15.774
22	20 24 58.69	2.5389	17 55 48.2	12.287	22	22 20 18.08	2.2783	6 22 13.7	15.798
23	20 27 30.85	2.5332	17 43 27.3	12.409	23	22 22 34.64	2.2739	6 6 25.1	15.821
24	20 30 2.67	2.5274	-17 30 59.1	+12.530	24	22 24 50.95	2.2698	-5 50 35.2	+15.842



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 25.					JANUARY 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 24 50.95	2.2698	-5 50 35.2	+15.842	0	0 10 15.96	2.1505	+ 6 40 21.6	+14.848
1	22 27 7.01	2.2656	5 34 44.1	15.860	1	0 12 24.97	2.1498	6 55 10.8	14.792
2	22 29 22.82	2.2614	5 18 52.0	15.877	2	0 14 33.93	2.1491	7 9 56.6	14.735
3	22 31 38.38	2.2574	5 2 58.9	15.892	3	0 16 42.86	2.1485	7 24 39.0	14.677
4	22 33 53.71	2.2534	4 47 5.0	15.905	4	0 18 51.75	2.1479	7 39 17.8	14.617
5	22 36 8.79	2.2495	4 31 10.3	15.917	5	0 21 0.61	2.1474	7 53 53.0	14.556
6	22 38 23.65	2.2458	4 15 15.0	15.925	6	0 23 9.44	2.1470	8 8 24.5	14.494
7	22 40 38.28	2.2419	3 59 19.3	15.933	7	0 25 18.25	2.1467	8 22 52.3	14.431
8	22 42 52.68	2.2383	3 43 23.1	15.938	8	0 27 27.04	2.1463	8 37 16.2	14.367
9	22 45 6.87	2.2347	3 27 26.7	15.942	9	0 29 35.81	2.1460	8 51 36.3	14.302
10	22 47 20.84	2.2310	3 11 30.1	15.944	10	0 31 44.56	2.1458	9 5 52.4	14.234
11	22 49 34.59	2.2276	2 55 33.4	15.945	11	0 33 53.31	2.1458	9 20 4.4	14.167
12	22 51 48.15	2.2243	2 39 36.7	15.943	12	0 36 2.05	2.1457	9 34 12.4	14.098
13	22 54 1.50	2.2209	2 23 40.2	15.940	13	0 38 10.79	2.1458	9 48 16.2	14.028
14	22 56 14.66	2.2177	2 7 43.9	15.935	14	0 40 19.54	2.1458	10 2 15.8	13.958
15	22 58 27.62	2.2144	1 51 48.0	15.928	15	0 42 28.28	2.1458	10 16 11.1	13.886
16	23 0 40.39	2.2113	1 35 52.6	15.920	16	0 44 37.04	2.1461	10 30 2.1	13.813
17	23 2 52.98	2.2083	1 19 57.6	15.910	17	0 46 45.81	2.1463	10 43 48.7	13.739
18	23 5 5.39	2.2054	1 4 3.4	15.898	18	0 48 54.59	2.1465	10 57 30.8	13.663
19	23 7 17.63	2.2025	0 48 9.8	15.886	19	0 51 3.39	2.1468	11 11 8.3	13.588
20	23 9 29.69	2.1997	0 32 17.1	15.870	20	0 53 12.21	2.1472	11 24 41.3	13.511
21	23 11 41.59	2.1969	0 16 25.4	15.853	21	0 55 21.05	2.1476	11 38 9.6	13.433
22	23 13 53.32	2.1943	-0 0 34.7	15.836	22	0 57 29.92	2.1481	11 51 33.3	13.354
23	23 16 4.90	2.1917	+0 15 14.9	+15.816	23	0 59 38.82	2.1486	+12 4 52.1	+13.274
JANUARY 26.					JANUARY 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 18 16.32	2.1891	+0 31 3.2	+15.794	0	1 1 47.75	2.1492	+12 18 6.2	+13.193
1	23 20 27.59	2.1867	0 46 50.2	15.772	1	1 3 56.72	2.1498	12 31 15.3	13.111
2	23 22 38.72	2.1844	1 2 35.8	15.747	2	1 6 5.72	2.1504	12 44 19.5	13.028
3	23 24 49.72	2.1821	1 18 19.8	15.721	3	1 8 14.77	2.1512	12 57 18.7	12.945
4	23 27 0.57	2.1798	1 34 2.3	15.693	4	1 10 23.86	2.1519	13 10 12.9	12.860
5	23 29 11.29	2.1777	1 49 43.0	15.664	5	1 12 33.00	2.1528	13 23 1.9	12.774
6	23 31 21.89	2.1757	2 5 22.0	15.634	6	1 14 42.19	2.1535	13 35 45.8	12.688
7	23 33 32.37	2.1737	2 20 59.1	15.603	7	1 16 51.42	2.1544	13 48 24.5	12.601
8	23 35 42.73	2.1718	2 36 34.3	15.569	8	1 19 0.72	2.1554	14 0 57.9	12.512
9	23 37 52.98	2.1698	2 52 7.4	15.534	9	1 21 10.07	2.1563	14 13 25.9	12.423
10	23 40 3.11	2.1680	3 7 38.4	15.498	10	1 23 19.48	2.1573	14 25 48.6	12.333
11	23 42 13.14	2.1663	3 23 7.1	15.459	11	1 25 28.94	2.1583	14 38 5.9	12.243
12	23 44 23.07	2.1648	3 38 33.5	15.421	12	1 27 38.48	2.1595	14 50 17.7	12.150
13	23 46 32.91	2.1632	3 53 57.6	15.380	13	1 29 48.06	2.1606	15 2 23.9	12.058
14	23 48 42.65	2.1617	4 9 19.1	15.338	14	1 31 57.75	2.1617	15 14 24.6	11.964
15	23 50 52.31	2.1603	4 24 38.2	15.296	15	1 34 7.48	2.1628	15 26 19.6	11.870
16	23 53 1.88	2.1588	4 39 54.6	15.251	16	1 36 17.29	2.1642	15 38 9.0	11.775
17	23 55 11.37	2.1576	4 55 8.3	15.205	17	1 38 27.18	2.1653	15 49 52.6	11.679
18	23 57 20.79	2.1564	5 10 19.2	15.158	18	1 40 37.13	2.1666	16 1 30.5	11.583
19	23 59 30.14	2.1553	5 25 27.2	15.109	19	1 42 47.17	2.1680	16 13 2.5	11.484
20	0 1 39.42	2.1542	5 40 32.3	15.059	20	1 44 57.29	2.1693	16 24 28.6	11.386
21	0 3 48.64	2.1532	5 55 34.3	15.008	21	1 47 7.48	2.1706	16 35 48.8	11.286
22	0 5 57.80	2.1523	6 10 33.3	14.957	22	1 49 17.76	2.1720	16 47 3.1	11.188
23	0 8 6.91	2.1513	6 25 29.1	14.903	23	1 51 28.12	2.1733	16 58 11.3	11.087
24	0 10 15.96	2.1505	+6 40 21.6	+14.848	24	1 53 38.56	2.1748	+17 9 13.5	+10.986

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JANUARY 29.					JANUARY 31.				
0	h m s	s	" "	" "	0	h m s	s	" "	" "
0	1 53 38.56	2.1748	+17 9 13.5	+10.986	0	3 39 48.31	2.2450	+23 47 43.0	+5.415
1	1 55 49.09	2.1763	17 20 9.6	10.883	1	3 42 3.04	2.2460	23 53 4.1	5.298
2	1 57 59.71	2.1778	17 30 59.5	10.781	2	3 44 17.83	2.2469	23 58 17.6	5.161
3	2 0 10.42	2.1793	17 41 43.3	10.678	3	3 46 32.67	2.2478	24 3 23.4	5.033
4	2 2 21.22	2.1808	17 52 20.8	10.573	4	3 48 47.57	2.2487	24 8 21.6	4.906
5	2 4 32.11	2.1823	18 2 52.1	10.468	5	3 51 2.51	2.2495	24 13 12.1	4.778
6	2 6 43.10	2.1838	18 13 17.0	10.363	6	3 53 17.51	2.2503	24 17 54.9	4.649
7	2 8 54.17	2.1853	18 23 35.6	10.257	7	3 55 32.54	2.2509	24 22 30.0	4.521
8	2 11 5.34	2.1869	18 33 47.8	10.150	8	3 57 47.62	2.2516	24 26 57.4	4.392
9	2 13 16.60	2.1885	18 43 53.6	10.042	9	4 0 2.73	2.2522	24 31 17.0	4.263
10	2 15 27.96	2.1901	18 53 52.8	9.933	10	4 2 17.88	2.2528	24 35 29.0	4.134
11	2 17 39.41	2.1916	19 3 45.6	9.825	11	4 4 33.06	2.2533	24 39 33.1	4.005
12	2 19 50.95	2.1933	19 13 31.8	9.715	12	4 6 48.27	2.2538	24 43 29.6	3.877
13	2 22 2.60	2.1949	19 23 11.4	9.605	13	4 9 3.51	2.2542	24 47 18.3	3.746
14	2 24 14.34	2.1965	19 32 44.4	9.494	14	4 11 18.77	2.2545	24 50 59.1	3.616
15	2 26 26.18	2.1982	19 42 10.7	9.383	15	4 13 34.05	2.2548	24 54 32.2	3.487
16	2 28 38.12	2.1998	19 51 30.3	9.271	16	4 15 49.35	2.2551	24 57 57.5	3.357
17	2 30 50.15	2.2013	20 0 43.2	9.158	17	4 18 4.66	2.2553	25 1 15.0	3.227
18	2 33 2.28	2.2030	20 9 49.3	9.044	18	4 20 19.99	2.2555	25 4 24.7	3.097
19	2 35 14.51	2.2046	20 18 48.5	8.930	19	4 22 35.32	2.2556	25 7 26.6	2.966
20	2 37 26.83	2.2063	20 27 40.9	8.817	20	4 24 50.66	2.2557	25 10 20.6	2.836
21	2 39 39.26	2.2078	20 36 26.5	8.702	21	4 27 6.00	2.2556	25 13 6.9	2.706
22	2 41 51.77	2.2094	20 45 5.1	8.585	22	4 29 21.33	2.2555	25 15 45.3	2.576
23	2 44 4.39	2.2110	+20 53 36.7	+ 8.468	23	4 31 36.66	2.2554	+25 18 16.0	+2.446
JANUARY 30.					FEBRUARY 1.				
0	h m s	s	" "	" "	0	h m s	s	" "	" "
0	2 46 17.09	2.2126	+21 2 1.3	+ 8.353	0	4 33 51.98	2.2553	+25 20 38.8	+2.315
1	2 48 29.90	2.2143	21 10 19.0	8.236	1	4 36 7.29	2.2550	25 22 53.8	2.184
2	2 50 42.80	2.2158	21 18 29.6	8.118	2	4 38 22.58	2.2547	25 25 0.9	2.054
3	2 52 55.79	2.2173	21 26 33.1	7.999	3	4 40 37.85	2.2543	25 27 0.3	1.924
4	2 55 8.87	2.2188	21 34 29.5	7.881	4	4 42 53.10	2.2539	25 28 51.8	1.793
5	2 57 22.05	2.2204	21 42 18.8	7.762	5	4 45 8.32	2.2533	25 30 35.5	1.663
6	2 59 35.32	2.2219	21 50 0.9	7.642	6	4 47 23.51	2.2528	25 32 11.4	1.533
7	3 1 48.68	2.2234	21 57 35.8	7.522	7	4 49 38.66	2.2523	25 33 39.4	1.403
8	3 4 2.13	2.2249	22 5 3.5	7.401	8	4 51 53.78	2.2517	25 34 59.7	1.273
9	3 6 15.67	2.2263	22 12 23.9	7.280	9	4 54 8.86	2.2509	25 36 12.2	1.143
10	3 8 29.29	2.2278	22 19 37.1	7.158	10	4 56 23.89	2.2501	25 37 16.8	1.013
11	3 10 43.00	2.2293	22 26 42.9	7.036	11	4 58 38.87	2.2493	25 38 13.7	0.883
12	3 12 56.80	2.2307	22 33 41.4	6.914	12	5 0 53.80	2.2483	25 39 2.8	0.753
13	3 15 10.68	2.2320	22 40 32.6	6.791	13	5 3 8.67	2.2474	25 39 44.1	0.624
14	3 17 24.64	2.2333	22 47 16.3	6.668	14	5 5 23.49	2.2464	25 40 17.7	0.496
15	3 19 38.68	2.2347	22 53 52.7	6.544	15	5 7 38.24	2.2453	25 40 43.6	0.367
16	3 21 52.80	2.2359	23 0 21.6	6.420	16	5 9 52.92	2.2441	25 41 1.7	0.237
17	3 24 6.99	2.2372	23 6 43.1	6.296	17	5 12 7.53	2.2429	25 41 12.0	+0.108
18	3 26 21.26	2.2384	23 12 57.1	6.172	18	5 14 22.07	2.2417	25 41 14.7	-0.020
19	3 28 35.60	2.2396	23 19 3.7	6.046	19	5 16 36.53	2.2403	25 41 9.6	0.148
20	3 30 50.01	2.2407	23 25 2.6	5.920	20	5 18 50.90	2.2388	25 40 56.9	0.276
21	3 33 4.48	2.2418	23 30 54.1	5.795	21	5 21 5.19	2.2374	25 40 36.5	0.401
22	3 35 19.03	2.2430	23 36 38.0	5.668	22	5 23 19.39	2.2359	25 40 8.4	0.532
23	3 37 33.64	2.2440	23 42 14.3	5.542	23	5 25 33.50	2.2343	25 39 32.7	0.658
24	3 39 48.31	2.2450	+23 47 43.0	+ 5.415	24	5 27 47.51	2.2327	+25 38 49.4	-0.785

## GREENWICH MEAN TIME.

Bour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
FEBRUARY 2.									FEBRUARY 4.								
	h	m	s	s	"	"	"			h	m	s	s	"	"	"	
0	5	27	47.51	2.2327	+25 38	49.4	-0.785	0	7	12	5.43	2.0972	+22 42	57.3	-6.334		
1	5	30	1.42	2.2310	25 37	58.5	0.913	1	7	14	11.15	2.0934	22 36	34.2	6.436		
2	5	32	15.23	2.2293	25 36	59.9	1.039	2	7	16	16.64	2.0898	22 30	5.0	6.536		
3	5	34	28.93	2.2274	25 35	53.8	1.164	3	7	18	21.92	2.0862	22 23	29.9	6.635		
4	5	36	42.52	2.2256	25 34	40.2	1.290	4	7	20	26.98	2.0824	22 16	48.8	6.733		
5	5	38	56.00	2.2237	25 33	19.0	1.416	5	7	22	31.81	2.0788	22 10	1.9	6.831		
6	5	41	9.36	2.2217	25 31	50.3	1.541	6	7	24	36.43	2.0751	22 3	9.1	6.929		
7	5	43	22.60	2.2196	25 30	14.1	1.665	7	7	26	40.82	2.0713	21 56	10.4	7.025		
8	5	45	35.71	2.2175	25 28	30.5	1.789	8	7	28	44.98	2.0676	21 49	6.1	7.121		
9	5	47	48.70	2.2154	25 26	39.4	1.913	9	7	30	48.93	2.0639	21 41	55.9	7.216		
10	5	50	1.56	2.2132	25 24	40.9	2.037	10	7	32	52.65	2.0601	21 34	40.2	7.310		
11	5	52	14.28	2.2108	25 22	35.0	2.159	11	7	34	56.14	2.0563	21 27	18.7	7.404		
12	5	54	26.86	2.2085	25 20	21.8	2.282	12	7	36	59.41	2.0527	21 19	51.7	7.496		
13	5	56	39.30	2.2062	25 18	1.2	2.404	13	7	39	2.46	2.0489	21 12	19.2	7.588		
14	5	58	51.60	2.2038	25 15	33.3	2.525	14	7	41	5.28	2.0451	21 4	41.1	7.679		
15	6	1	3.76	2.2013	25 12	58.2	2.647	15	7	43	7.87	2.0413	20 56	57.7	7.769		
16	6	3	15.76	2.1988	25 10	15.7	2.768	16	7	45	10.24	2.0376	20 49	8.8	7.860		
17	6	5	27.61	2.1963	25 7	26.0	2.888	17	7	47	12.38	2.0338	20 41	14.5	7.948		
18	6	7	39.31	2.1937	25 4	29.2	3.008	18	7	49	14.30	2.0302	20 33	15.0	8.036		
19	6	9	50.85	2.1909	25 1	25.1	3.128	19	7	51	16.00	2.0264	20 25	10.2	8.124		
20	6	12	2.22	2.1882	24 58	13.9	3.246	20	7	53	17.47	2.0227	20 17	0.1	8.211		
21	6	14	13.43	2.1855	24 54	55.6	3.364	21	7	55	18.72	2.0189	20 8	44.9	8.296		
22	6	16	24.48	2.1827	24 51	30.2	3.482	22	7	57	19.74	2.0152	20 0	24.6	8.381		
23	6	18	35.35	2.1798	+24 47	57.8	-3.599	23	7	59	20.54	2.0115	+19 51	59.2	-8.465		
FEBRUARY 3.									FEBRUARY 5.								
	h	m	s	s	"	"	"			h	m	s	s	"	"	"	
0	6	20	46.06	2.1770	+24 44	18.3	-3.716	0	8	1	21.12	2.0078	+19 43	28.8	-8.548		
1	6	22	56.59	2.1740	24 40	31.9	3.833	1	8	3	21.47	2.0041	19 34	53.4	8.632		
2	6	25	6.94	2.1710	24 36	38.4	3.948	2	8	5	21.61	2.0004	19 26	13.0	8.713		
3	6	27	17.11	2.1680	24 32	38.1	4.063	3	8	7	21.52	1.9967	19 17	27.8	8.794		
4	6	29	27.10	2.1650	24 28	30.9	4.178	4	8	9	21.21	1.9930	19 8	37.7	8.875		
5	6	31	36.91	2.1618	24 24	16.8	4.292	5	8	11	20.68	1.9893	18 59	42.8	8.954		
6	6	33	46.52	2.1587	24 19	55.9	4.404	6	8	13	19.93	1.9858	18 50	43.2	9.033		
7	6	35	55.95	2.1556	24 15	28.3	4.517	7	8	15	18.97	1.9821	18 41	38.9	9.111		
8	6	38	5.19	2.1523	24 10	53.9	4.629	8	8	17	17.78	1.9785	18 32	29.9	9.188		
9	6	40	14.23	2.1490	24 6	12.8	4.741	9	8	19	16.39	1.9749	18 23	16.3	9.264		
10	6	42	23.07	2.1458	24 1	25.0	4.853	10	8	21	14.77	1.9713	18 13	58.2	9.340		
11	6	44	31.72	2.1425	23 56	30.5	4.963	11	8	23	12.95	1.9678	18 4	35.5	9.415		
12	6	46	40.17	2.1392	23 51	29.5	5.072	12	8	25	10.91	1.9643	17 55	8.4	9.488		
13	6	48	48.42	2.1358	23 46	21.9	5.180	13	8	27	8.66	1.9608	17 45	36.9	9.562		
14	6	50	56.47	2.1324	23 41	7.9	5.288	14	8	29	6.20	1.9573	17 36	1.0	9.634		
15	6	53	4.31	2.1289	23 35	47.3	5.397	15	8	31	3.53	1.9538	17 26	20.8	9.706		
16	6	55	11.94	2.1255	23 30	20.3	5.503	16	8	33	0.65	1.9503	17 16	36.3	9.777		
17	6	57	19.37	2.1221	23 24	46.9	5.610	17	8	34	57.57	1.9469	17 6	47.6	9.847		
18	6	59	26.59	2.1186	23 19	7.1	5.716	18	8	36	54.28	1.9435	16 56	54.7	9.916		
19	7	1	33.60	2.1150	23 13	21.0	5.820	19	8	38	50.79	1.9402	16 46	57.7	9.985		
20	7	3	40.39	2.1114	23 7	28.7	5.924	20	8	40	47.10	1.9368	16 36	56.5	10.053		
21	7	5	46.97	2.1079	23 1	30.1	6.028	21	8	42	43.21	1.9335	16 26	51.4	10.119		
22	7	7	53.34	2.1043	22 55	25.3	6.132	22	8	44	39.12	1.9303	16 16	42.2	10.186		
23	7	9	59.49	2.1008	22 49	14.3	6.233	23	8	46	34.84	1.9270	16 6	29.1	10.251		
24	7	12	5.43	2.0972	+22 42	57.3	-6.334	24	8	48	30.36	1.9238	+15 56	12.1	-10.315		

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 6.					FEBRUARY 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	8 48 30.36	1.9238	+15 56 12.1	-10.315	0	10 17 50.13	1.8152	+6 41 26.2	-12.508
1	8 50 25.69	1.9206	15 45 51.3	10.379	1	10 19 39.01	1.8141	6 28 54.9	12.534
2	8 52 20.83	1.9174	15 35 26.6	10.443	2	10 21 27.82	1.8130	6 16 22.1	12.561
3	8 54 15.78	1.9143	15 24 58.2	10.504	3	10 23 16.57	1.8121	6 3 47.6	12.588
4	8 56 10.54	1.9111	15 14 26.1	10.565	4	10 25 5.27	1.8112	5 51 11.6	12.612
5	8 58 5.11	1.9081	15 3 50.4	10.626	5	10 26 53.91	1.8102	5 38 34.2	12.636
6	8 59 59.51	1.9051	14 53 11.0	10.687	6	10 28 42.49	1.8093	5 25 55.3	12.660
7	9 1 53.72	1.9020	14 42 28.0	10.746	7	10 30 31.03	1.8087	5 13 15.0	12.683
8	9 3 47.75	1.8991	14 31 41.5	10.803	8	10 32 19.53	1.8079	5 0 33.4	12.705
9	9 5 41.61	1.8962	14 20 51.6	10.861	9	10 34 7.98	1.8073	4 47 50.4	12.727
10	9 7 35.29	1.8932	14 9 58.2	10.918	10	10 35 56.40	1.8067	4 35 6.2	12.747
11	9 9 28.79	1.8903	13 59 1.4	10.974	11	10 37 44.78	1.8061	4 22 20.8	12.767
12	9 11 22.13	1.8876	13 48 1.3	11.029	12	10 39 33.13	1.8056	4 9 34.2	12.786
13	9 13 15.30	1.8848	13 36 57.9	11.083	13	10 41 21.45	1.8052	3 56 46.5	12.804
14	9 15 8.30	1.8820	13 25 51.3	11.137	14	10 43 9.75	1.8048	3 43 57.7	12.823
15	9 17 1.14	1.8793	13 14 41.5	11.189	15	10 44 58.03	1.8044	3 31 7.8	12.839
16	9 18 53.81	1.8766	13 3 28.6	11.242	16	10 46 46.28	1.8042	3 18 17.0	12.855
17	9 20 46.33	1.8740	12 52 12.5	11.293	17	10 48 34.53	1.8040	3 5 25.2	12.871
18	9 22 38.69	1.8714	12 40 53.4	11.343	18	10 50 22.76	1.8038	2 52 32.5	12.886
19	9 24 30.90	1.8689	12 29 31.3	11.393	19	10 52 10.99	1.8038	2 39 38.9	12.900
20	9 26 22.96	1.8664	12 18 6.2	11.443	20	10 53 59.22	1.8038	2 26 44.5	12.913
21	9 28 14.87	1.8639	12 6 38.2	11.491	21	10 55 47.44	1.8038	2 13 49.4	12.925
22	9 30 6.63	1.8615	11 55 7.3	11.538	22	10 57 35.67	1.8039	2 0 53.5	12.938
23	9 31 58.25	1.8592	+11 43 33.7	-11.584	23	10 59 23.91	1.8041	+1 47 56.9	-12.949
FEBRUARY 7.					FEBRUARY 9.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 33 49.73	1.8568	+11 31 57.2	-11.631	0	11 1 12.16	1.8043	+1 34 59.6	-12.959
1	9 35 41.07	1.8545	11 20 18.0	11.676	1	11 3 0.42	1.8045	1 22 1.8	12.969
2	9 37 32.27	1.8523	11 8 36.1	11.720	2	11 4 48.70	1.8049	1 9 3.3	12.978
3	9 39 23.34	1.8501	10 56 51.6	11.763	3	11 6 37.01	1.8053	0 56 4.4	12.986
4	9 41 14.28	1.8479	10 45 4.5	11.807	4	11 8 25.34	1.8057	0 43 5.0	12.993
5	9 43 5.09	1.8458	10 33 14.8	11.848	5	11 10 13.69	1.8062	0 30 5.2	13.001
6	9 44 55.78	1.8438	10 21 22.7	11.890	6	11 12 2.08	1.8068	0 17 4.9	13.007
7	9 46 46.34	1.8418	10 9 28.0	11.931	7	11 13 50.51	1.8074	+0 4 4.4	13.012
8	9 48 36.79	1.8398	9 57 31.0	11.970	8	11 15 38.97	1.8081	-0 8 56.5	13.017
9	9 50 27.12	1.8379	9 45 31.6	12.010	9	11 17 27.48	1.8089	0 21 57.6	13.020
10	9 52 17.34	1.8360	9 33 29.8	12.048	10	11 19 16.04	1.8097	0 34 58.9	13.023
11	9 54 7.44	1.8342	9 21 25.8	12.086	11	11 21 4.64	1.8105	0 48 0.3	13.025
12	9 55 57.44	1.8325	9 9 19.5	12.123	12	11 22 53.30	1.8115	1 1 1.9	13.027
13	9 57 47.34	1.8308	8 57 11.0	12.159	13	11 24 42.02	1.8125	1 14 3.5	13.028
14	9 59 37.13	1.8290	8 45 0.4	12.194	14	11 26 30.80	1.8136	1 27 5.2	13.028
15	10 1 26.82	1.8274	8 32 47.7	12.228	15	11 28 19.65	1.8147	1 40 6.9	13.028
16	10 3 16.42	1.8259	8 20 33.0	12.263	16	11 30 8.56	1.8158	1 53 8.5	13.026
17	10 5 5.93	1.8244	8 8 16.2	12.296	17	11 31 57.55	1.8172	2 6 10.0	13.023
18	10 6 55.35	1.8229	7 55 57.5	12.328	18	11 33 46.62	1.8185	2 19 11.3	13.020
19	10 8 44.68	1.8214	7 43 36.8	12.361	19	11 35 35.77	1.8198	2 32 12.4	13.017
20	10 10 33.92	1.8201	7 31 14.2	12.391	20	11 37 25.00	1.8213	2 45 13.3	13.013
21	10 12 23.09	1.8188	7 18 49.9	12.421	21	11 39 14.32	1.8228	2 58 14.0	13.008
22	10 14 12.18	1.8175	7 6 23.7	12.451	22	11 41 3.73	1.8243	3 11 14.2	13.001
23	10 16 1.19	1.8163	6 53 55.8	12.479	23	11 42 53.24	1.8261	3 24 14.1	12.994
24	10 17 50.13	1.8152	+ 6 41 26.2	-12.508	24	11 44 42.86	1.8278	-3 37 13.5	-12.987

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 10.					FEBRUARY 12.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	11 44 42.86	1.8278	- 3 37 13.5	-12.987	0	13 15 38.19	1.9856	-13 36 26.1	-11.645
1	11 46 32.58	1.8295	3 50 12.5	12.978	1	13 17 37.47	1.9905	13 48 3.3	11.594
2	11 48 22.40	1.8313	4 3 10.9	12.969	2	13 19 37.05	1.9954	13 59 37.4	11.543
3	11 50 12.33	1.8332	4 16 8.8	12.960	3	13 21 36.92	2.0004	14 11 8.5	11.491
4	11 52 2.38	1.8352	4 29 6.1	12.949	4	13 23 37.10	2.0054	14 22 36.3	11.437
5	11 53 52.55	1.8373	4 42 2.7	12.938	5	13 25 37.57	2.0105	14 34 0.9	11.383
6	11 55 42.85	1.8393	4 54 58.6	12.926	6	13 27 38.36	2.0157	14 45 22.2	11.327
7	11 57 33.26	1.8413	5 7 53.8	12.913	7	13 29 39.45	2.0208	14 56 40.1	11.270
8	11 59 23.81	1.8437	5 20 48.1	12.898	8	13 31 40.86	2.0262	15 7 54.6	11.212
9	12 1 14.50	1.8459	5 33 41.6	12.884	9	13 33 42.59	2.0315	15 19 5.5	11.153
10	12 3 5.32	1.8483	5 46 34.2	12.869	10	13 35 44.64	2.0368	15 30 13.0	11.093
11	12 4 56.29	1.8507	5 59 25.9	12.853	11	13 37 47.01	2.0423	15 41 16.7	11.032
12	12 6 47.40	1.8531	6 12 16.5	12.835	12	13 39 49.71	2.0478	15 52 16.8	10.970
13	12 8 38.66	1.8557	6 25 6.1	12.818	13	13 41 52.74	2.0533	16 3 13.1	10.907
14	12 10 30.08	1.8583	6 37 54.6	12.799	14	13 43 56.11	2.0589	16 14 5.6	10.843
15	12 12 21.66	1.8610	6 50 42.0	12.780	15	13 45 59.81	2.0645	16 24 54.2	10.778
16	12 14 13.40	1.8637	7 3 28.2	12.759	16	13 48 3.85	2.0703	16 35 38.9	10.711
17	12 16 5.30	1.8664	7 16 13.1	12.738	17	13 50 8.24	2.0760	16 46 19.5	10.643
18	12 17 57.37	1.8693	7 28 56.8	12.717	18	13 52 12.97	2.0818	16 56 56.0	10.574
19	12 19 49.62	1.8723	7 41 39.1	12.693	19	13 54 18.06	2.0878	17 7 28.4	10.504
20	12 21 42.05	1.8753	7 54 20.0	12.670	20	13 56 23.50	2.0936	17 17 56.5	10.433
21	12 23 34.66	1.8783	8 6 59.5	12.645	21	13 58 29.29	2.0995	17 28 20.3	10.361
22	12 25 27.45	1.8815	8 19 37.4	12.620	22	14 0 35.44	2.1055	17 38 39.8	10.288
23	12 27 20.44	1.8848	- 8 32 13.9	-12.594	23	14 2 41.95	2.1115	-17 48 54.8	-10.212
FEBRUARY 11.					FEBRUARY 13.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	12 29 13.62	1.8880	- 8 44 48.7	-12.567	0	14 4 48.82	2.1176	-17 59 5.2	-10.136
1	12 31 7.00	1.8913	8 57 21.9	12.539	1	14 6 56.06	2.1238	18 9 11.1	10.059
2	12 33 0.58	1.8947	9 9 53.4	12.510	2	14 9 3.67	2.1299	18 19 12.3	9.981
3	12 34 54.36	1.8982	9 22 23.1	12.480	3	14 11 11.65	2.1361	18 29 8.8	9.902
4	12 36 48.36	1.9017	9 34 51.0	12.450	4	14 13 20.00	2.1423	18 39 0.5	9.821
5	12 38 42.56	1.9053	9 47 17.1	12.418	5	14 15 28.73	2.1486	18 48 47.3	9.738
6	12 40 36.99	1.9089	9 59 41.2	12.386	6	14 17 37.83	2.1549	18 58 29.1	9.655
7	12 42 31.63	1.9126	10 12 3.4	12.353	7	14 19 47.32	2.1613	19 8 5.9	9.572
8	12 44 26.50	1.9164	10 24 23.6	12.319	8	14 21 57.19	2.1677	19 17 37.7	9.486
9	12 46 21.60	1.9203	10 36 41.7	12.283	9	14 24 7.44	2.1741	19 27 4.2	9.398
10	12 48 16.93	1.9242	10 48 57.6	12.248	10	14 26 18.08	2.1806	19 36 25.5	9.311
11	12 50 12.50	1.9282	11 1 11.4	12.212	11	14 28 29.11	2.1870	19 45 41.5	9.222
12	12 52 8.31	1.9322	11 13 23.0	12.174	12	14 30 40.52	2.1935	19 54 52.1	9.131
13	12 54 4.36	1.9363	11 25 32.3	12.134	13	14 32 52.33	2.2001	20 3 57.2	9.038
14	12 56 0.67	1.9405	11 37 39.1	12.094	14	14 35 4.53	2.2066	20 12 56.7	8.945
15	12 57 57.22	1.9447	11 49 43.6	12.054	15	14 37 17.12	2.2133	20 21 50.6	8.851
16	12 59 54.03	1.9491	12 1 45.6	12.013	16	14 39 30.12	2.2199	20 30 38.8	8.755
17	13 1 51.11	1.9534	12 13 45.1	11.971	17	14 41 43.51	2.2264	20 39 21.2	8.658
18	13 3 48.44	1.9578	12 25 42.1	11.928	18	14 43 57.29	2.2331	20 47 57.8	8.560
19	13 5 46.04	1.9623	12 37 36.4	11.882	19	14 46 11.48	2.2398	20 56 28.4	8.459
20	13 7 43.92	1.9668	12 49 27.9	11.837	20	14 48 26.07	2.2465	21 4 52.9	8.358
21	13 9 42.06	1.9714	13 1 16.8	11.791	21	14 50 41.06	2.2532	21 13 11.4	8.257
22	13 11 40.49	1.9762	13 13 2.8	11.743	22	14 52 56.45	2.2599	21 21 23.7	8.153
23	13 13 39.20	1.9808	13 24 45.9	11.694	23	14 55 12.25	2.2667	21 29 29.7	8.048
24	13 15 38.19	1.9856	-13 36 26.1	-11.645	24	14 57 28.45	2.2733	-21 37 29.4	-7.942

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 14.					FEBRUARY 16.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	14 57 28.45	2.2733	-21 37 29.4	-7.942	0	16 53 56.38	2.5597	-25 31 22.7	-1.331
1	14 59 45.06	2.2801	21 45 22.7	7.834	1	16 56 30.09	2.5638	25 32 37.6	1.166
2	15 2 2.06	2.2868	21 53 9.5	7.725	2	16 59 4.04	2.5679	25 33 42.6	1.000
3	15 4 19.47	2.2936	22 0 49.7	7.614	3	17 1 38.24	2.5718	25 34 37.6	0.833
4	15 6 37.28	2.3003	22 8 23.2	7.503	4	17 4 12.66	2.5757	25 35 22.6	0.665
5	15 8 55.50	2.3070	22 15 50.0	7.390	5	17 6 47.32	2.5795	25 35 57.4	0.497
6	15 11 14.12	2.3137	22 23 10.0	7.276	6	17 9 22.20	2.5831	25 36 22.2	0.328
7	15 13 33.14	2.3203	22 30 23.1	7.160	7	17 11 57.29	2.5865	25 36 36.7	-0.157
8	15 15 52.56	2.3271	22 37 29.2	7.043	8	17 14 32.58	2.5899	25 36 41.0	+0.013
9	15 18 12.39	2.3338	22 44 28.3	6.925	9	17 17 8.08	2.5932	25 36 35.1	0.184
10	15 20 32.62	2.3405	22 51 20.2	6.805	10	17 19 43.76	2.5963	25 36 18.9	0.357
11	15 22 53.25	2.3472	22 58 4.9	6.684	11	17 22 19.63	2.5993	25 35 52.3	0.530
12	15 25 14.28	2.3538	23 4 42.3	6.562	12	17 24 55.68	2.6023	25 35 15.3	0.703
13	15 27 35.71	2.3605	23 11 12.3	6.438	13	17 27 31.90	2.6049	25 34 27.9	0.876
14	15 29 57.54	2.3671	23 17 34.9	6.314	14	17 30 8.27	2.6075	25 33 30.2	1.050
15	15 32 19.76	2.3737	23 23 50.0	6.188	15	17 32 44.80	2.6100	25 32 21.9	1.226
16	15 34 42.38	2.3802	23 29 57.4	6.069	16	17 35 21.47	2.6123	25 31 3.1	1.400
17	15 37 5.38	2.3867	23 35 57.1	5.930	17	17 37 58.28	2.6146	25 29 33.9	1.575
18	15 39 28.78	2.3933	23 41 49.0	5.801	18	17 40 35.22	2.6166	25 27 54.1	1.752
19	15 41 52.57	2.3997	23 47 33.2	5.669	19	17 43 12.27	2.6185	25 26 3.7	1.928
20	15 44 16.74	2.4061	23 53 9.3	5.536	20	17 45 49.44	2.6203	25 24 2.8	2.104
21	15 46 41.30	2.4124	23 58 37.5	5.403	21	17 48 26.71	2.6221	25 21 51.2	2.281
22	15 49 6.23	2.4188	24 3 57.6	5.268	22	17 51 4.09	2.6236	25 19 29.1	2.457
23	15 51 31.55	2.4251	-24 9 9.6	-5.130	23	17 53 41.54	2.6249	-25 16 56.4	+2.634
FEBRUARY 15.					FEBRUARY 17.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	15 53 57.24	2.4313	-24 14 13.2	-4.992	0	17 56 19.08	2.6263	-25 14 13.0	+2.812
1	15 56 23.30	2.4375	24 19 8.6	4.853	1	17 58 56.69	2.6274	25 11 19.0	2.989
2	15 58 49.74	2.4437	24 23 55.6	4.713	2	18 1 34.37	2.6283	25 8 14.3	3.168
3	16 1 16.54	2.4497	24 28 34.1	4.570	3	18 4 12.09	2.6292	25 4 58.9	3.345
4	16 3 43.70	2.4557	24 33 4.0	4.428	4	18 6 49.87	2.6300	25 1 32.9	3.522
5	16 6 11.22	2.4616	24 37 25.4	4.284	5	18 9 27.69	2.6305	24 57 56.3	3.699
6	16 8 39.09	2.4675	24 41 38.1	4.138	6	18 12 5.53	2.6309	24 54 9.0	3.878
7	16 11 7.32	2.4734	24 45 42.0	3.992	7	18 14 43.40	2.6313	24 50 11.0	4.055
8	16 13 35.90	2.4791	24 49 37.1	3.844	8	18 17 21.29	2.6315	24 46 2.4	4.232
9	16 16 4.81	2.4848	24 53 23.3	3.695	9	18 19 59.18	2.6315	24 41 43.2	4.409
10	16 18 34.07	2.4904	24 57 0.5	3.545	10	18 22 37.07	2.6314	24 37 13.3	4.586
11	16 21 3.66	2.4959	25 0 28.7	3.393	11	18 25 14.95	2.6313	24 32 32.9	4.763
12	16 23 33.58	2.5014	25 3 47.7	3.241	12	18 27 52.82	2.6309	24 27 41.8	4.939
13	16 26 3.83	2.5068	25 6 57.6	3.088	13	18 30 30.66	2.6304	24 22 40.2	5.115
14	16 28 34.39	2.5120	25 9 58.3	2.933	14	18 33 8.47	2.6298	24 17 28.0	5.292
15	16 31 5.27	2.5172	25 12 49.6	2.778	15	18 35 46.23	2.6290	24 12 5.2	5.467
16	16 33 36.45	2.5223	25 15 31.6	2.622	16	18 38 23.95	2.6283	24 6 32.0	5.641
17	16 36 7.95	2.5273	25 18 4.2	2.463	17	18 41 1.62	2.6273	24 0 48.3	5.816
18	16 38 39.73	2.5322	25 20 27.2	2.304	18	18 43 39.22	2.6260	23 54 54.1	5.989
19	16 41 11.81	2.5371	25 22 40.7	2.145	19	18 46 16.74	2.6248	23 48 49.6	6.163
20	16 43 44.18	2.5418	25 24 44.6	1.984	20	18 48 54.20	2.6235	23 42 34.6	6.336
21	16 46 16.82	2.5463	25 26 38.8	1.823	21	18 51 31.56	2.6220	23 36 9.3	6.508
22	16 48 49.74	2.5509	25 28 23.3	1.659	22	18 54 8.84	2.6204	23 29 33.7	6.678
23	16 51 22.93	2.5553	25 29 57.9	1.495	23	18 56 46.01	2.6187	23 22 47.9	6.849
24	16 53 56.38	2.5597	-25 31 22.7	-1.331	24	18 59 23.08	2.6168	-23 15 51.8	+7.020

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 18.					FEBRUARY 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 59 23.08	2.6168	-23 15 51.8	+7.020	0	21 1 17.05	2.4419	-14 44 39.5	+13.713
1	19 2 0.03	2.6149	23 8 45.5	7.189	1	21 3 43.43	2.4375	14 30 53.8	13.811
2	19 4 36.87	2.6129	23 1 29.1	7.358	2	21 6 9.55	2.4332	14 17 2.2	13.908
3	19 7 13.58	2.6107	22 54 2.6	7.525	3	21 8 35.41	2.4288	14 3 4.9	14.002
4	19 9 50.15	2.6084	22 46 26.1	7.692	4	21 11 1.00	2.4243	13 49 2.0	14.095
5	19 12 26.59	2.6061	22 38 39.6	7.858	5	21 13 26.33	2.4200	13 34 53.5	14.186
6	19 15 2.88	2.6036	22 30 43.2	8.023	6	21 15 51.40	2.4156	13 20 39.7	14.274
7	19 17 39.02	2.6011	22 22 36.9	8.187	7	21 18 16.20	2.4113	13 6 20.6	14.362
8	19 20 15.01	2.5984	22 14 20.8	8.350	8	21 20 40.75	2.4070	12 51 56.3	14.446
9	19 22 50.83	2.5956	22 5 54.9	8.513	9	21 23 5.04	2.4027	12 37 27.1	14.528
10	19 25 26.48	2.5928	21 57 19.3	8.673	10	21 25 29.07	2.3984	12 22 52.9	14.610
11	19 28 1.96	2.5898	21 48 34.2	8.832	11	21 27 52.85	2.3942	12 8 13.9	14.688
12	19 30 37.26	2.5868	21 39 39.5	8.991	12	21 30 16.37	2.3899	11 53 30.3	14.765
13	19 33 12.38	2.5837	21 30 35.3	9.148	13	21 32 39.64	2.3858	11 38 42.1	14.840
14	19 35 47.30	2.5804	21 21 21.7	9.304	14	21 35 2.66	2.3816	11 23 49.5	14.913
15	19 38 22.03	2.5773	21 11 58.8	9.459	15	21 37 25.43	2.3774	11 8 52.5	14.984
16	19 40 56.57	2.5739	21 2 26.6	9.613	16	21 39 47.95	2.3734	10 53 51.4	15.053
17	19 43 30.90	2.5704	20 52 45.2	9.766	17	21 42 10.24	2.3693	10 38 46.2	15.119
18	19 46 5.02	2.5670	20 42 54.7	9.917	18	21 44 32.27	2.3653	10 23 37.1	15.183
19	19 48 38.94	2.5634	20 32 55.2	10.066	19	21 46 54.07	2.3614	10 8 24.2	15.246
20	19 51 12.63	2.5598	20 22 46.8	10.215	20	21 49 15.64	2.3574	9 53 7.6	15.307
21	19 53 46.11	2.5561	20 12 29.4	10.362	21	21 51 36.96	2.3535	9 37 47.4	15.365
22	19 56 19.36	2.5523	20 2 3.4	10.507	22	21 53 58.06	2.3497	9 22 23.8	15.422
23	19 58 52.39	2.5485	-19 51 28.6	+10.651	23	21 56 18.92	2.3458	-9 6 56.8	+15.476
FEBRUARY 19.					FEBRUARY 21.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 1 25.18	2.5446	-19 40 45.3	+10.793	0	21 58 39.56	2.3421	-8 51 26.7	+15.528
1	20 3 57.74	2.5408	19 29 53.4	10.934	1	22 0 59.97	2.3383	8 35 53.5	15.578
2	20 6 30.07	2.5368	19 18 53.2	11.073	2	22 3 20.16	2.3347	8 20 17.3	15.627
3	20 9 2.15	2.5328	19 7 44.6	11.212	3	22 5 40.13	2.3311	8 4 38.3	15.673
4	20 11 34.00	2.5287	18 56 27.8	11.348	4	22 7 59.89	2.3275	7 48 56.6	15.717
5	20 14 5.59	2.5245	18 45 2.8	11.483	5	22 10 19.43	2.3239	7 33 12.3	15.759
6	20 16 36.94	2.5204	18 33 29.8	11.616	6	22 12 38.76	2.3204	7 17 25.5	15.798
7	20 19 8.04	2.5163	18 21 48.9	11.748	7	22 14 57.88	2.3170	7 1 36.5	15.837
8	20 21 38.89	2.5121	18 10 0.1	11.878	8	22 17 16.80	2.3137	6 45 45.1	15.873
9	20 24 9.49	2.5078	17 58 3.6	12.006	9	22 19 35.52	2.3104	6 29 51.7	15.907
10	20 26 39.82	2.5034	17 45 59.5	12.132	10	22 21 54.05	2.3071	6 13 56.3	15.938
11	20 29 9.90	2.4993	17 33 47.8	12.257	11	22 24 12.37	2.3038	5 57 59.1	15.968
12	20 31 39.73	2.4949	17 21 28.7	12.379	12	22 26 30.50	2.3007	5 42 0.1	15.997
13	20 34 9.29	2.4905	17 9 2.3	12.501	13	22 28 48.45	2.2976	5 25 59.5	16.023
14	20 36 38.59	2.4862	16 56 28.6	12.620	14	22 31 6.21	2.2945	5 9 57.4	16.047
15	20 39 7.63	2.4818	16 43 47.9	12.738	15	22 33 23.79	2.2915	4 53 53.9	16.068
16	20 41 36.41	2.4774	16 31 0.1	12.853	16	22 35 41.19	2.2886	4 37 49.2	16.088
17	20 44 4.92	2.4729	16 18 5.5	12.967	17	22 37 58.42	2.2858	4 21 43.3	16.107
18	20 46 33.16	2.4685	16 5 4.1	13.079	18	22 40 15.48	2.2830	4 5 36.4	16.123
19	20 49 1.14	2.4642	15 51 56.0	13.189	19	22 42 32.38	2.2803	3 49 28.6	16.137
20	20 51 28.86	2.4597	15 38 41.4	13.298	20	22 44 49.11	2.2775	3 33 20.0	16.149
21	20 53 56.30	2.4553	15 25 20.3	13.404	21	22 47 5.68	2.2748	3 17 10.7	16.159
22	20 56 23.49	2.4508	15 11 52.9	13.508	22	22 49 22.09	2.2723	3 1 0.9	16.168
23	20 58 50.40	2.4463	14 58 19.3	13.612	23	22 51 38.35	2.2698	2 44 50.6	16.174
24	21 1 17.05	2.4419	-14 44 39.5	+13.713	24	22 53 54.46	2.2673	-2 28 40.0	+16.178



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 22.					FEBRUARY 24.				
0	h m s	s	° ' "	"	0	h m s	s	° ' "	"
0	22 53 54.46	2.2673	-2 28 40.0	+16.178	0	0 41 4.80	2.2205	+ 9 59 12.8	+14.359
1	22 56 10.43	2.2650	2 12 29.2	16.181	1	0 43 18.04	2.2200	10 13 32.1	14.283
2	22 58 26.26	2.2626	1 56 18.3	16.182	2	0 45 31.31	2.2213	10 27 46.8	14.207
3	23 0 41.94	2.2603	1 40 7.4	16.180	3	0 47 44.60	2.2218	10 41 56.9	14.129
4	23 2 57.50	2.2582	1 23 56.7	16.177	4	0 49 57.92	2.2223	10 56 2.3	14.051
5	23 5 12.92	2.2560	1 7 46.2	16.173	5	0 52 11.27	2.2228	11 10 3.0	13.971
6	23 7 28.22	2.2539	0 51 36.0	16.166	6	0 54 24.65	2.2233	11 23 58.8	13.888
7	23 9 43.39	2.2519	0 35 26.3	16.157	7	0 56 38.07	2.2239	11 37 49.6	13.806
8	23 11 58.45	2.2500	0 19 17.2	16.146	8	0 58 51.52	2.2245	11 51 35.5	13.723
9	23 14 13.39	2.2480	-0 3 8.8	16.133	9	1 1 5.01	2.2253	12 5 16.4	13.638
10	23 16 28.21	2.2462	+0 12 58.8	16.120	10	1 3 18.55	2.2259	12 18 52.1	13.552
11	23 18 42.93	2.2444	0 29 5.6	16.103	11	1 5 32.12	2.2266	12 32 22.6	13.464
12	23 20 57.54	2.2428	0 45 11.2	16.085	12	1 7 45.74	2.2274	12 45 47.8	13.376
13	23 23 12.06	2.2411	1 1 15.8	16.066	13	1 9 59.41	2.2283	12 59 7.7	13.286
14	23 25 26.47	2.2395	1 17 19.1	16.044	14	1 12 13.14	2.2292	13 12 22.1	13.195
15	23 27 40.80	2.2381	1 33 21.1	16.022	15	1 14 26.91	2.2300	13 25 31.1	13.104
16	23 29 55.04	2.2366	1 49 21.7	15.998	16	1 16 40.74	2.2309	13 38 34.6	13.011
17	23 32 9.19	2.2352	2 5 20.8	15.970	17	1 18 54.62	2.2318	13 51 32.4	12.916
18	23 34 23.26	2.2338	2 21 18.1	15.942	18	1 21 8.56	2.2328	14 4 24.5	12.822
19	23 36 37.25	2.2325	2 37 13.8	15.913	19	1 23 22.55	2.2338	14 17 11.0	12.726
20	23 38 51.16	2.2313	2 53 7.6	15.881	20	1 25 36.61	2.2348	14 29 51.6	12.629
21	23 41 5.01	2.2303	3 8 59.5	15.848	21	1 27 50.73	2.2359	14 42 26.4	12.531
22	23 43 18.79	2.2291	3 24 49.3	15.812	22	1 30 4.92	2.2369	14 54 55.3	12.432
23	23 45 32.50	2.2280	+3 40 36.9	+15.775	23	1 32 19.16	2.2379	+15 7 18.2	+12.331
FEBRUARY 23.					FEBRUARY 25.				
0	23 47 46.15	2.2271	+3 56 22.3	+15.738	0	1 34 33.47	2.2391	+15 19 35.0	+12.229
1	23 49 59.75	2.2263	4 12 5.4	15.698	1	1 36 47.85	2.2403	15 31 45.7	12.128
2	23 52 13.30	2.2253	4 27 46.0	15.655	2	1 39 2.30	2.2414	15 43 50.3	12.025
3	23 54 26.79	2.2245	4 43 24.0	15.612	3	1 41 16.82	2.2426	15 55 48.7	11.921
4	23 56 40.24	2.2238	4 58 59.4	15.568	4	1 43 31.41	2.2438	16 7 40.8	11.815
5	23 58 53.65	2.2232	5 14 32.1	15.522	5	1 45 46.07	2.2449	16 19 26.5	11.709
6	0 1 7.02	2.2226	5 30 2.0	15.473	6	1 48 0.80	2.2461	16 31 5.9	11.603
7	0 3 20.36	2.2220	5 45 28.9	15.423	7	1 50 15.60	2.2473	16 42 38.9	11.496
8	0 5 33.66	2.2215	6 0 52.8	15.373	8	1 52 30.48	2.2486	16 54 5.4	11.387
9	0 7 46.94	2.2211	6 16 13.6	15.320	9	1 54 45.43	2.2498	17 5 25.3	11.277
10	0 10 0.19	2.2206	6 31 31.2	15.266	10	1 57 0.46	2.2511	17 16 38.6	11.167
11	0 12 13.41	2.2203	6 46 45.5	15.210	11	1 59 15.56	2.2523	17 27 45.3	11.057
12	0 14 26.62	2.2200	7 1 56.4	15.153	12	2 1 30.73	2.2535	17 38 45.4	10.945
13	0 16 39.81	2.2198	7 17 3.9	15.095	13	2 3 45.98	2.2548	17 49 38.7	10.832
14	0 18 53.00	2.2197	7 32 7.8	15.035	14	2 6 1.31	2.2562	18 0 25.2	10.718
15	0 21 6.17	2.2195	7 47 8.1	14.973	15	2 8 16.72	2.2574	18 11 4.9	10.604
16	0 23 19.34	2.2194	8 2 4.6	14.911	16	2 10 32.20	2.2587	18 21 37.7	10.489
17	0 25 32.50	2.2193	8 16 57.4	14.847	17	2 12 47.76	2.2600	18 32 3.6	10.373
18	0 27 45.66	2.2194	8 31 46.2	14.780	18	2 15 3.40	2.2613	18 42 22.5	10.257
19	0 29 58.83	2.2195	8 46 31.0	14.713	19	2 17 19.11	2.2624	18 52 34.4	10.140
20	0 32 12.00	2.2196	9 1 11.8	14.646	20	2 19 34.89	2.2638	19 2 39.3	10.023
21	0 34 25.18	2.2198	9 15 48.5	14.576	21	2 21 50.76	2.2651	19 12 37.1	9.903
22	0 36 38.37	2.2200	9 30 20.9	14.504	22	2 24 6.70	2.2663	19 22 27.7	9.781
23	0 38 51.58	2.2203	9 44 49.0	14.433	23	2 26 22.71	2.2675	19 32 11.2	9.665
24	0 41 4.80	2.2205	+9 59 12.8	+14.359	24	2 28 38.80	2.2688	+19 41 47.5	+ 9.544



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
FEBRUARY 26.					FEBRUARY 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	2 28 38.80	2.2688	+19 41 47.5	+9.544	0	4 18 30.09	2.2939	+24 52 5.4	+3.271
1	2 30 54.96	2.2700	19 51 16.5	9.423	1	4 20 47.71	2.2933	24 55 17.6	3.136
2	2 33 11.20	2.2713	20 0 38.2	9.301	2	4 23 5.28	2.2926	24 58 21.7	3.001
3	2 35 27.51	2.2724	20 9 52.6	9.179	3	4 25 22.82	2.2919	25 1 17.7	2.866
4	2 37 43.89	2.2736	20 18 59.7	9.056	4	4 27 40.31	2.2912	25 4 5.6	2.731
5	2 40 0.34	2.2748	20 27 59.3	8.932	5	4 29 57.76	2.2903	25 6 45.4	2.597
6	2 42 16.86	2.2759	20 36 51.5	8.808	6	4 32 15.15	2.2894	25 9 17.2	2.462
7	2 44 33.45	2.2771	20 45 36.3	8.683	7	4 34 32.49	2.2885	25 11 40.8	2.327
8	2 46 50.11	2.2782	20 54 13.5	8.558	8	4 36 49.77	2.2875	25 13 56.4	2.193
9	2 49 6.83	2.2793	21 2 43.3	8.433	9	4 39 6.99	2.2865	25 16 3.9	2.058
10	2 51 23.62	2.2803	21 11 5.4	8.306	10	4 41 24.15	2.2853	25 18 3.4	1.924
11	2 53 40.47	2.2813	21 19 20.0	8.179	11	4 43 41.23	2.2841	25 19 54.8	1.790
12	2 55 57.38	2.2824	21 27 26.9	8.052	12	4 45 58.24	2.2829	25 21 38.2	1.657
13	2 58 14.36	2.2834	21 35 26.2	7.924	13	4 48 15.18	2.2817	25 23 13.6	1.523
14	3 0 31.39	2.2843	21 43 17.8	7.797	14	4 50 32.04	2.2803	25 24 40.9	1.389
15	3 2 48.48	2.2853	21 51 1.8	7.668	15	4 52 48.81	2.2788	25 26 0.3	1.257
16	3 5 5.63	2.2863	21 58 37.9	7.538	16	4 55 5.50	2.2774	25 27 11.7	1.123
17	3 7 22.83	2.2871	22 6 6.4	7.409	17	4 57 22.10	2.2759	25 28 15.1	0.991
18	3 9 40.08	2.2879	22 13 27.0	7.279	18	4 59 38.61	2.2743	25 29 10.6	0.859
19	3 11 57.38	2.2888	22 20 39.9	7.149	19	5 1 55.02	2.2727	25 29 58.2	0.727
20	3 14 14.73	2.2896	22 27 44.9	7.018	20	5 4 11.33	2.2709	25 30 37.8	0.594
21	3 16 32.13	2.2903	22 34 42.1	6.888	21	5 6 27.53	2.2693	25 31 9.5	0.463
22	3 18 49.57	2.2910	22 41 31.4	6.756	22	5 8 43.64	2.2675	25 31 33.4	0.332
23	3 21 7.05	2.2918	+22 48 12.8	+6.625	23	5 10 59.63	2.2655	+25 31 49.3	+0.201
FEBRUARY 27.					MARCH 1.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	3 23 24.58	2.2924	+22 54 46.4	+6.493	0	5 13 15.50	2.2636	+25 31 57.5	+0.071
1	3 25 42.14	2.2930	23 1 12.0	6.361	1	5 15 31.26	2.2617	25 31 57.8	-0.060
2	3 27 59.74	2.2935	23 7 29.7	6.228	2	5 17 46.90	2.2596	25 31 50.3	0.190
3	3 30 17.36	2.2940	23 13 39.4	6.096	3	5 20 2.41	2.2575	25 31 35.0	0.320
4	3 32 35.02	2.2945	23 19 41.2	5.963	4	5 22 17.80	2.2554	25 31 11.9	0.448
5	3 34 52.70	2.2949	23 25 34.9	5.829	5	5 24 33.06	2.2532	25 30 41.2	0.578
6	3 37 10.41	2.2953	23 31 20.7	5.696	6	5 26 48.18	2.2509	25 30 2.6	0.707
7	3 39 28.14	2.2957	23 36 58.4	5.563	7	5 29 3.17	2.2487	25 29 16.4	0.833
8	3 41 45.89	2.2960	23 42 28.2	5.428	8	5 31 18.02	2.2463	25 28 22.6	0.961
9	3 44 3.66	2.2963	23 47 49.8	5.294	9	5 33 32.72	2.2438	25 27 21.1	1.089
10	3 46 21.44	2.2964	23 53 3.5	5.161	10	5 35 47.28	2.2414	25 26 11.9	1.216
11	3 48 39.23	2.2965	23 58 9.1	5.025	11	5 38 1.69	2.2389	25 24 55.2	1.342
12	3 50 57.02	2.2966	24 3 6.5	4.890	12	5 40 15.95	2.2363	25 23 30.9	1.468
13	3 53 14.82	2.2968	24 7 55.9	4.757	13	5 42 30.05	2.2338	25 21 59.1	1.593
14	3 55 32.63	2.2968	24 12 37.3	4.623	14	5 44 44.00	2.2311	25 20 19.8	1.718
15	3 57 50.43	2.2968	24 17 10.6	4.487	15	5 46 57.78	2.2283	25 18 33.0	1.843
16	4 0 8.24	2.2967	24 21 35.7	4.352	16	5 49 11.40	2.2256	25 16 38.7	1.966
17	4 2 26.03	2.2964	24 25 52.8	4.218	17	5 51 24.85	2.2228	25 14 37.1	2.089
18	4 4 43.81	2.2963	24 30 1.8	4.083	18	5 53 38.13	2.2199	25 12 28.0	2.213
19	4 7 1.58	2.2960	24 34 2.7	3.948	19	5 55 51.24	2.2171	25 10 11.6	2.335
20	4 9 19.33	2.2956	24 37 55.5	3.812	20	5 58 4.18	2.2142	25 7 47.8	2.457
21	4 11 37.05	2.2953	24 41 40.1	3.677	21	6 0 16.94	2.2112	25 5 16.8	2.578
22	4 13 54.76	2.2949	24 45 16.7	3.542	22	6 2 29.52	2.2082	25 2 38.5	2.699
23	4 16 12.44	2.2944	24 48 45.1	3.406	23	6 4 41.92	2.2051	24 59 52.9	2.819
	4 18 30.09	2.2939	+24 52 5.4	+3.271	24	6 6 54.13	2.2020	+24 57 0.2	-2.938

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 2.					MARCH 4.				
0	h m s	s	"	"	0	h m s	s	"	"
0	6 6 54.13	2.2020	+24 57 0.2	-2.938	0	7 48 31.78	2.0274	+20 29 59.3	7.925
1	6 9 6.16	2.1989	24 54 0.3	3.058	1	7 50 33.31	2.0236	20 22 1.2	8.012
2	6 11 18.00	2.1957	24 50 53.3	3.177	2	7 52 34.61	2.0198	20 13 57.9	8.098
3	6 13 29.64	2.1925	24 47 39.1	3.295	3	7 54 35.69	2.0162	20 5 49.5	8.183
4	6 15 41.10	2.1893	24 44 17.9	3.412	4	7 56 36.55	2.0124	19 57 36.0	8.267
5	6 17 52.35	2.1859	24 40 49.7	3.528	5	7 58 37.18	2.0087	19 49 17.5	8.350
6	6 20 3.41	2.1827	24 37 14.5	3.645	6	8 0 37.59	2.0051	19 40 54.0	8.433
7	6 22 14.27	2.1793	24 33 32.3	3.761	7	8 2 37.79	2.0014	19 32 25.5	8.516
8	6 24 24.93	2.1760	24 29 43.2	3.876	8	8 4 37.76	1.9978	19 23 52.1	8.597
9	6 26 35.39	2.1726	24 25 47.2	3.990	9	8 6 37.52	1.9942	19 15 13.9	8.678
10	6 28 45.64	2.1691	24 21 44.4	4.104	10	8 8 37.06	1.9905	19 6 30.8	8.758
11	6 30 55.68	2.1656	24 17 34.7	4.218	11	8 10 36.38	1.9869	18 57 43.0	8.836
12	6 33 5.51	2.1622	24 13 18.3	4.329	12	8 12 35.49	1.9833	18 48 50.5	8.914
13	6 35 15.14	2.1587	24 8 55.2	4.442	13	8 14 34.38	1.9798	18 39 53.3	8.993
14	6 37 24.55	2.1551	24 4 25.3	4.553	14	8 16 33.07	1.9763	18 30 51.4	9.070
15	6 39 33.75	2.1515	23 59 48.8	4.663	15	8 18 31.54	1.9728	18 21 44.9	9.146
16	6 41 42.73	2.1479	23 55 5.8	4.773	16	8 20 29.80	1.9693	18 12 33.9	9.221
17	6 43 51.50	2.1443	23 50 16.1	4.883	17	8 22 27.85	1.9658	18 3 18.4	9.296
18	6 46 0.05	2.1407	23 45 19.9	4.991	18	8 24 25.70	1.9624	17 53 58.4	9.370
19	6 48 8.38	2.1370	23 40 17.2	5.099	19	8 26 23.34	1.9591	17 44 34.0	9.443
20	6 50 16.49	2.1334	23 35 8.0	5.207	20	8 28 20.79	1.9557	17 35 5.3	9.515
21	6 52 24.39	2.1298	23 29 52.4	5.313	21	8 30 18.02	1.9523	17 25 32.2	9.588
22	6 54 32.06	2.1259	23 24 30.5	5.418	22	8 32 15.06	1.9490	17 15 54.8	9.658
23	6 56 39.50	2.1223	+23 19 2.2	-5.524	23	8 34 11.90	1.9458	+17 6 13.2	-9.728
MARCH 3.					MARCH 5.				
0	h m s	s	"	"	0	h m s	s	"	"
0	6 58 46.73	2.1186	+23 13 27.6	-5.628	0	8 36 8.55	1.9425	+16 56 27.4	-9.798
1	7 0 53.73	2.1148	23 7 46.8	5.733	1	8 38 5.00	1.9393	16 46 37.5	9.867
2	7 3 0.50	2.1110	23 1 59.7	5.836	2	8 40 1.26	1.9361	16 36 43.4	9.935
3	7 5 7.05	2.1073	22 56 6.5	5.938	3	8 41 57.33	1.9328	16 26 45.3	10.003
4	7 7 13.37	2.1034	22 50 7.1	6.040	4	8 43 53.20	1.9297	16 16 43.1	10.069
5	7 9 19.46	2.0997	22 44 1.7	6.141	5	8 45 48.89	1.9267	16 6 37.0	10.134
6	7 11 25.33	2.0958	22 37 50.2	6.241	6	8 47 44.40	1.9237	15 56 27.0	10.199
7	7 13 30.96	2.0920	22 31 32.8	6.341	7	8 49 39.73	1.9206	15 46 13.1	10.264
8	7 15 36.37	2.0883	22 25 9.3	6.441	8	8 51 34.87	1.9176	15 35 55.3	10.328
9	7 17 41.55	2.0845	22 18 39.9	6.538	9	8 53 29.84	1.9146	15 25 33.7	10.391
10	7 19 46.51	2.0807	22 12 4.7	6.636	10	8 55 24.62	1.9117	15 15 8.4	10.453
11	7 21 51.23	2.0768	22 5 23.6	6.733	11	8 57 19.24	1.9088	15 4 39.4	10.514
12	7 23 55.72	2.0729	21 58 36.8	6.828	12	8 59 13.68	1.9059	14 54 6.7	10.575
13	7 25 59.98	2.0692	21 51 44.2	6.924	13	9 1 7.95	1.9032	14 43 30.4	10.635
14	7 28 4.02	2.0653	21 44 45.9	7.018	14	9 3 2.06	1.9003	14 32 50.5	10.694
15	7 30 7.82	2.0615	21 37 42.0	7.113	15	9 4 55.99	1.8976	14 22 7.1	10.753
16	7 32 11.40	2.0577	21 30 32.4	7.206	16	9 6 49.77	1.8950	14 11 20.2	10.811
17	7 34 14.74	2.0538	21 23 17.3	7.298	17	9 8 43.39	1.8923	14 0 29.8	10.868
18	7 36 17.86	2.0501	21 15 56.7	7.389	18	9 10 36.84	1.8896	13 49 36.1	10.923
19	7 38 20.75	2.0463	21 8 30.6	7.481	19	9 12 30.14	1.8871	13 38 39.0	10.979
20	7 40 23.41	2.0424	21 0 59.0	7.571	20	9 14 23.29	1.8846	13 27 38.6	11.034
21	7 42 25.84	2.0386	20 53 22.1	7.660	21	9 16 16.29	1.8820	13 16 34.9	11.088
22	7 44 28.04	2.0348	20 45 39.8	7.749	22	9 18 9.13	1.8796	13 5 28.0	11.141
23	7 46 30.02	2.0312	20 37 52.2	7.838	23	9 20 1.84	1.8772	12 54 18.0	11.193
24	7 48 31.78	2.0274	+20 29 59.3	-7.925	24	9 21 54.39	1.8748	+12 43 4.8	-11.246

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 6.					MARCH 8.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	9 21 54.39	1.8748	+12 43 4.8	-11.246	0	10 50 3.67	1.8178	+2 57 21.5	-12.877
1	9 23 46.81	1.8725	12 31 48.5	11.298	1	10 51 52.74	1.8179	2 44 28.4	12.893
2	9 25 39.09	1.8702	12 20 29.1	11.348	2	10 53 41.82	1.8181	2 31 34.4	12.908
3	9 27 31.23	1.8679	12 9 6.8	11.397	3	10 55 30.91	1.8183	2 18 39.5	12.923
4	9 29 23.24	1.8658	11 57 41.5	11.447	4	10 57 20.02	1.8186	2 5 43.7	12.936
5	9 31 15.12	1.8636	11 46 13.2	11.495	5	10 59 9.14	1.8189	1 52 47.2	12.948
6	9 33 6.87	1.8614	11 34 42.1	11.542	6	11 0 58.29	1.8193	1 39 49.9	12.961
7	9 34 58.49	1.8594	11 23 8.2	11.588	7	11 2 47.46	1.8197	1 26 51.9	12.972
8	9 36 50.00	1.8574	11 11 31.5	11.635	8	11 4 36.65	1.8202	1 13 53.3	12.982
9	9 38 41.38	1.8554	10 59 52.0	11.680	9	11 6 25.88	1.8208	1 0 54.1	12.992
10	9 40 32.65	1.8535	10 48 9.9	11.724	10	11 8 15.15	1.8214	0 47 54.3	13.002
11	9 42 23.80	1.8516	10 36 25.1	11.768	11	11 10 4.45	1.8220	0 34 53.9	13.009
12	9 44 14.84	1.8498	10 24 37.7	11.812	12	11 11 53.79	1.8228	0 21 53.2	13.016
13	9 46 5.78	1.8481	10 12 47.7	11.854	13	11 13 43.18	1.8236	+0 8 52.0	13.023
14	9 47 56.61	1.8463	10 0 55.2	11.896	14	11 15 32.62	1.8244	-0 4 9.6	13.028
15	9 49 47.33	1.8446	9 49 0.2	11.938	15	11 17 22.11	1.8253	0 17 11.4	13.033
16	9 51 37.96	1.8430	9 37 2.7	11.978	16	11 19 11.66	1.8263	0 30 13.6	13.038
17	9 53 28.49	1.8414	9 25 2.9	12.017	17	11 21 1.26	1.8273	0 43 16.0	13.042
18	9 55 18.93	1.8399	9 13 0.7	12.055	18	11 22 50.93	1.8284	0 56 18.6	13.044
19	9 57 9.28	1.8383	9 0 56.3	12.093	19	11 24 40.67	1.8295	1 9 21.3	13.046
20	9 58 59.53	1.8369	8 48 49.5	12.131	20	11 26 30.47	1.8307	1 22 24.1	13.047
21	10 0 49.71	1.8356	8 36 40.6	12.167	21	11 28 20.35	1.8319	1 35 26.9	13.047
22	10 2 39.80	1.8342	8 24 29.5	12.203	22	11 30 10.30	1.8333	1 48 29.7	13.047
23	10 4 29.81	1.8329	+ 8 12 16.2	-12.238	23	11 32 0.34	1.8346	-2 1 32.5	-13.045
MARCH 7.					MARCH 9.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	10 6 19.75	1.8317	+ 8 0 0.9	-12.273	0	11 33 50.45	1.8360	-2 14 35.1	-13.043
1	10 8 9.61	1.8305	7 47 43.5	12.307	1	11 35 40.66	1.8375	2 27 37.6	13.040
2	10 9 59.41	1.8293	7 35 24.1	12.340	2	11 37 30.95	1.8390	2 40 39.9	13.036
3	10 11 49.13	1.8283	7 23 2.7	12.372	3	11 39 21.34	1.8407	2 53 41.9	13.031
4	10 13 38.80	1.8273	7 10 39.5	12.403	4	11 41 11.83	1.8423	3 6 43.6	13.025
5	10 15 28.40	1.8263	6 58 14.3	12.434	5	11 43 2.42	1.8440	3 19 44.9	13.019
6	10 17 17.95	1.8253	6 45 47.4	12.463	6	11 44 53.11	1.8458	3 32 45.9	13.013
7	10 19 7.44	1.8244	6 33 18.7	12.493	7	11 46 43.91	1.8477	3 45 46.4	13.003
8	10 20 56.88	1.8237	6 20 48.2	12.522	8	11 48 34.83	1.8496	3 58 46.3	12.994
9	10 22 46.28	1.8229	6 8 16.1	12.549	9	11 50 25.86	1.8515	4 11 45.7	12.986
10	10 24 35.63	1.8222	5 55 42.3	12.577	10	11 52 17.01	1.8535	4 24 44.6	12.975
11	10 26 24.94	1.8215	5 43 6.9	12.603	11	11 54 8.28	1.8555	4 37 42.7	12.963
12	10 28 14.21	1.8208	5 30 30.0	12.628	12	11 55 59.67	1.8576	4 50 40.1	12.951
13	10 30 3.44	1.8203	5 17 51.5	12.653	13	11 57 51.19	1.8598	5 3 36.8	12.938
14	10 31 52.65	1.8198	5 5 11.6	12.677	14	11 59 42.85	1.8621	5 16 32.6	12.923
15	10 33 41.82	1.8193	4 52 30.3	12.701	15	12 1 34.64	1.8644	5 29 27.6	12.909
16	10 35 30.97	1.8190	4 39 47.5	12.724	16	12 3 26.58	1.8668	5 42 21.7	12.893
17	10 37 20.10	1.8187	4 27 3.4	12.745	17	12 5 18.65	1.8692	5 55 14.8	12.877
18	10 39 9.21	1.8183	4 14 18.1	12.766	18	12 7 10.88	1.8717	6 8 6.9	12.859
19	10 40 58.30	1.8182	4 1 31.5	12.787	19	12 9 3.25	1.8742	6 20 57.9	12.841
20	10 42 47.39	1.8180	3 48 43.7	12.807	20	12 10 55.78	1.8768	6 33 47.8	12.822
21	10 44 36.46	1.8178	3 35 54.7	12.825	21	12 12 48.47	1.8794	6 46 36.5	12.802
22	10 46 25.53	1.8178	3 23 4.7	12.843	22	12 14 41.31	1.8822	6 59 24.0	12.781
23	10 48 14.60	1.8178	3 10 13.6	12.860	23	12 16 34.33	1.8850	7 12 10.2	12.758
24	10 50 3.67	1.8178	+ 2 57 21.5	-12.877	24	12 18 27.51	1.8878	-7 24 55.0	-12.735

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
MARCH 10.									MARCH 12.								
	h	m	s	s	"	"	"	"		h	m	s	s	"	"	"	
0	12	18	27.51	1.8878	- 7	24	55.0	-12.735	0	13	53	22.77	2.0868	-16	51	37.7	-10.484
1	12	20	20.86	1.8907	7	37	38.4	12.712	1	13	55	28.14	2.0922	17	2	4.6	10.411
2	12	22	14.39	1.8936	7	50	20.4	12.688	2	13	57	33.83	2.0974	17	12	27.0	10.337
3	12	24	8.09	1.8966	8	3	0.9	12.663	3	13	59	39.83	2.1028	17	22	45.0	10.263
4	12	26	1.98	1.8997	8	15	39.9	12.636	4	14	1	46.16	2.1082	17	32	58.5	10.186
5	12	27	56.05	1.9028	8	28	17.2	12.608	5	14	3	52.81	2.1136	17	43	7.3	10.108
6	12	29	50.31	1.9059	8	40	52.8	12.579	6	14	5	59.79	2.1191	17	53	11.4	10.029
7	12	31	44.76	1.9092	8	53	26.7	12.551	7	14	8	7.10	2.1245	18	3	10.8	9.949
8	12	33	39.41	1.9125	9	5	58.9	12.521	8	14	10	14.73	2.1300	18	13	5.3	9.868
9	12	35	34.26	1.9158	9	18	29.2	12.488	9	14	12	22.70	2.1355	18	22	55.0	9.787
10	12	37	29.30	1.9192	9	30	57.5	12.457	10	14	14	30.99	2.1410	18	32	39.7	9.703
11	12	39	24.56	1.9227	9	43	24.0	12.424	11	14	16	39.62	2.1467	18	42	19.3	9.618
12	12	41	20.02	1.9262	9	55	48.4	12.389	12	14	18	48.59	2.1523	18	51	53.9	9.533
13	12	43	15.70	1.9298	10	8	10.7	12.355	13	14	20	57.89	2.1579	19	1	23.3	9.446
14	12	45	11.59	1.9333	10	20	31.0	12.319	14	14	23	7.54	2.1636	19	10	47.4	9.358
15	12	47	7.70	1.9370	10	32	49.0	12.282	15	14	25	17.52	2.1692	19	20	6.2	9.268
16	12	49	4.03	1.9408	10	45	4.8	12.243	16	14	27	27.84	2.1748	19	29	19.6	9.178
17	12	51	0.59	1.9446	10	57	18.2	12.204	17	14	29	38.50	2.1805	19	38	27.6	9.087
18	12	52	57.38	1.9484	11	9	29.3	12.165	18	14	31	49.50	2.1863	19	47	30.0	8.993
19	12	54	54.40	1.9523	11	21	38.0	12.124	19	14	34	0.85	2.1920	19	56	26.8	8.899
20	12	56	51.66	1.9563	11	33	44.2	12.082	20	14	36	12.54	2.1978	20	5	17.9	8.804
21	12	58	49.15	1.9603	11	45	47.8	12.039	21	14	38	24.58	2.2035	20	14	3.3	8.708
22	13	0	46.89	1.9643	11	57	48.9	11.996	22	14	40	36.96	2.2092	20	22	42.9	8.611
23	13	2	44.87	1.9684	-12	9	47.3	-11.950	23	14	42	49.68	2.2149	-20	31	16.6	-8.512
MARCH 11.									MARCH 13.								
	h	m	s	s	"	"	"	"		h	m	s	s	"	"	"	
0	13	4	43.10	1.9726	-12	21	42.9	-11.904	0	14	45	2.75	2.2208	-20	39	44.3	-8.412
1	13	6	41.58	1.9768	12	33	35.8	11.858	1	14	47	16.17	2.2265	20	48	6.0	8.311
2	13	8	40.32	1.9811	12	45	25.8	11.809	2	14	49	29.93	2.2323	20	56	21.6	8.208
3	13	10	39.31	1.9854	12	57	12.9	11.760	3	14	51	44.04	2.2381	21	4	31.0	8.105
4	13	12	38.57	1.9898	13	8	57.0	11.710	4	14	53	58.50	2.2438	21	12	34.2	8.001
5	13	14	38.08	1.9942	13	20	38.1	11.659	5	14	56	13.30	2.2496	21	20	31.1	7.894
6	13	16	37.87	1.9987	13	32	16.1	11.608	6	14	58	28.45	2.2554	21	28	21.5	7.788
7	13	18	37.92	2.0032	13	43	51.0	11.554	7	15	0	43.95	2.2612	21	36	5.6	7.680
8	13	20	38.25	2.0078	13	55	22.6	11.500	8	15	2	59.79	2.2669	21	43	43.1	7.570
9	13	22	38.85	2.0123	14	6	51.0	11.445	9	15	5	15.98	2.2727	21	51	14.0	7.459
10	13	24	39.73	2.0170	14	18	16.0	11.388	10	15	7	32.51	2.2783	21	58	38.2	7.348
11	13	26	40.89	2.0218	14	29	37.6	11.331	11	15	9	49.38	2.2841	22	5	55.7	7.235
12	13	28	42.34	2.0265	14	40	55.7	11.273	12	15	12	6.60	2.2898	22	13	6.4	7.121
13	13	30	44.07	2.0313	14	52	10.3	11.213	13	15	14	24.16	2.2955	22	20	10.2	7.006
14	13	32	46.09	2.0361	15	3	21.2	11.152	14	15	16	42.06	2.3012	22	27	7.1	6.889
15	13	34	48.40	2.0410	15	14	28.5	11.090	15	15	19	0.30	2.3068	22	33	56.9	6.771
16	13	36	51.01	2.0460	15	25	32.0	11.028	16	15	21	18.88	2.3124	22	40	39.6	6.653
17	13	38	53.92	2.0509	15	36	31.8	10.963	17	15	23	37.79	2.3180	22	47	15.2	6.533
18	13	40	57.12	2.0559	15	47	27.6	10.898	18	15	25	57.04	2.3236	22	53	43.5	6.412
19	13	43	0.63	2.0610	15	58	19.6	10.833	19	15	28	16.62	2.3291	23	0	4.6	6.289
20	13	45	4.44	2.0661	16	9	7.5	10.764	20	15	30	36.53	2.3347	23	6	18.2	6.166
21	13	47	8.56	2.0712	16	19	51.3	10.696	21	15	32	56.78	2.3402	23	12	24.5	6.042
22	13	49	12.98	2.0763	16	30	31.0	10.627	22	15	35	17.35	2.3455	23	18	23.2	5.916
23	13	51	17.72	2.0816	16	41	6.5	10.556	23	15	37	38.24	2.3509	23	24	14.4	5.790
24	13	53	22.77	2.0868	-16	51	37.7	-10.484	24	15	39	59.46	2.3563	-23	29	58.0	-5.663

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 14.					MARCH 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 39 59.46	2.3563	-23 29 58.0	-5.663	0	17 38 4.57	2.5315	-25 16 28.1	+1.511
1	15 42 21.00	2.3617	23 35 33.9	5.533	1	17 40 36.50	2.5328	25 14 52.6	1.674
2	15 44 42.86	2.3670	23 41 1.9	5.403	2	17 43 8.51	2.5340	25 13 7.2	1.838
3	15 47 5.04	2.3723	23 46 22.2	5.272	3	17 45 40.58	2.5351	25 11 12.0	2.002
4	15 49 27.53	2.3774	23 51 34.5	5.139	4	17 48 12.72	2.5362	25 9 7.0	2.166
5	15 51 50.33	2.3825	23 56 38.9	5.007	5	17 50 44.92	2.5370	25 6 52.1	2.330
6	15 54 13.43	2.3876	24 1 35.3	4.873	6	17 53 17.16	2.5378	25 4 27.4	2.493
7	15 56 36.84	2.3927	24 6 23.6	4.737	7	17 55 49.45	2.5385	25 1 52.9	2.658
8	15 59 0.55	2.3977	24 11 3.7	4.600	8	17 58 21.78	2.5390	24 59 8.5	2.823
9	16 1 24.56	2.4026	24 15 35.6	4.463	9	18 0 54.13	2.5394	24 56 14.2	2.987
10	16 3 48.86	2.4074	24 19 59.3	4.325	10	18 3 26.51	2.5398	24 53 10.1	3.150
11	16 6 13.45	2.4123	24 24 14.6	4.186	11	18 5 58.91	2.5401	24 49 56.2	3.314
12	16 8 38.33	2.4170	24 28 21.6	4.046	12	18 8 31.32	2.5402	24 46 32.4	3.478
13	16 11 3.49	2.4217	24 32 20.1	3.904	13	18 11 3.73	2.5402	24 42 58.8	3.643
14	16 13 28.93	2.4263	24 36 10.1	3.762	14	18 13 36.14	2.5401	24 39 15.3	3.807
15	16 15 54.65	2.4308	24 39 51.5	3.619	15	18 16 8.54	2.5398	24 35 22.0	3.970
16	16 18 20.63	2.4353	24 43 24.4	3.475	16	18 18 40.92	2.5396	24 31 18.9	4.133
17	16 20 46.88	2.4397	24 46 48.5	3.329	17	18 21 13.29	2.5392	24 27 6.0	4.297
18	16 23 13.39	2.4440	24 50 3.9	3.184	18	18 23 45.62	2.5387	24 22 43.3	4.459
19	16 25 40.16	2.4483	24 53 10.6	3.038	19	18 26 17.93	2.5381	24 18 10.9	4.622
20	16 28 7.19	2.4524	24 56 8.4	2.890	20	18 28 50.19	2.5373	24 13 28.7	4.784
21	16 30 34.45	2.4565	24 58 57.4	2.742	21	18 31 22.41	2.5366	24 8 36.8	4.946
22	16 33 1.97	2.4606	25 1 37.4	2.592	22	18 33 54.58	2.5357	24 3 35.2	5.108
23	16 35 29.72	2.4644	-25 4 8.4	-2.442	23	18 36 26.69	2.5347	-23 58 23.8	+5.270
MARCH 15.					MARCH 17.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 37 57.70	2.4683	-25 6 30.4	-2.291	0	18 38 58.74	2.5336	-23 53 2.8	+5.430
1	16 40 25.91	2.4721	25 8 43.3	2.139	1	18 41 30.72	2.5323	23 47 32.2	5.590
2	16 42 54.35	2.4758	25 10 47.1	1.988	2	18 44 2.62	2.5311	23 41 52.0	5.751
3	16 45 23.00	2.4793	25 12 41.8	1.834	3	18 46 34.45	2.5298	23 36 2.1	5.910
4	16 47 51.86	2.4828	25 14 27.2	1.680	4	18 49 6.19	2.5283	23 30 2.8	6.068
5	16 50 20.93	2.4862	25 16 3.4	1.526	5	18 51 37.84	2.5267	23 23 53.9	6.227
6	16 52 50.20	2.4894	25 17 30.3	1.371	6	18 54 9.39	2.5250	23 17 35.6	6.384
7	16 55 19.66	2.4927	25 18 47.9	1.215	7	18 56 40.84	2.5233	23 11 7.8	6.542
8	16 57 49.32	2.4958	25 19 56.1	1.058	8	18 59 12.19	2.5216	23 4 30.6	6.698
9	17 0 19.16	2.4988	25 20 54.9	0.902	9	19 1 43.43	2.5197	22 57 44.0	6.854
10	17 2 49.17	2.5017	25 21 44.3	0.745	10	19 4 14.55	2.5177	22 50 48.1	7.008
11	17 5 19.36	2.5045	25 22 24.3	0.587	11	19 6 45.55	2.5157	22 43 43.0	7.163
12	17 7 49.71	2.5072	25 22 54.7	0.428	12	19 9 16.43	2.5136	22 36 28.6	7.317
13	17 10 20.22	2.5098	25 23 15.6	0.268	13	19 11 47.18	2.5113	22 29 5.0	7.470
14	17 12 50.89	2.5123	25 23 26.9	-0.108	14	19 14 17.79	2.5090	22 21 32.2	7.622
15	17 15 21.70	2.5147	25 23 28.6	+0.052	15	19 16 48.26	2.5067	22 13 50.4	7.773
16	17 17 52.65	2.5170	25 23 20.7	0.212	16	19 19 18.59	2.5043	22 5 59.5	7.923
17	17 20 23.74	2.5192	25 23 3.2	0.373	17	19 21 48.78	2.5018	21 57 59.6	8.073
18	17 22 54.95	2.5213	25 22 35.9	0.535	18	19 24 18.81	2.4993	21 49 50.7	8.222
19	17 25 26.29	2.5233	25 21 59.0	0.696	19	19 26 48.69	2.4967	21 41 33.0	8.369
20	17 27 57.74	2.5251	25 21 12.4	0.858	20	19 29 18.41	2.4940	21 33 6.4	8.517
21	17 30 29.30	2.5268	25 20 16.0	1.022	21	19 31 47.97	2.4913	21 24 31.0	8.663
22	17 33 0.96	2.5285	25 19 9.8	1.184	22	19 34 17.37	2.4885	21 15 46.9	8.807
23	17 35 32.72	2.5301	25 17 53.9	1.348	23	19 36 46.59	2.4857	21 6 54.2	8.951
24	17 38 4.57	2.5315	-25 16 28.1	+1.511	24	19 39 15.65	2.4828	-20 57 52.8	+9.094

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 18.					MARCH 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 39 15.65	2.4828	-20 57 52.8	+ 9.094	0	21 34 37.41	2.3233	-11 20 43.1	+14.395
1	19 41 44.53	2.4799	20 48 42.9	9.236	1	21 36 56.72	2.3203	11 6 17.2	14.468
2	19 44 13.24	2.4769	20 39 24.5	9.377	2	21 39 15.85	2.3173	10 51 47.0	14.539
3	19 46 41.76	2.4738	20 29 57.7	9.516	3	21 41 34.80	2.3144	10 37 12.5	14.608
4	19 49 10.10	2.4708	20 20 22.6	9.655	4	21 43 53.58	2.3116	10 22 34.1	14.674
5	19 51 38.25	2.4677	20 10 39.1	9.793	5	21 46 12.19	2.3088	10 7 51.6	14.741
6	19 54 6.22	2.4646	20 0 47.5	9.928	6	21 48 30.63	2.3058	9 53 5.2	14.804
7	19 56 34.00	2.4613	19 50 47.7	10.064	7	21 50 48.89	2.3031	9 38 15.1	14.865
8	19 59 1.58	2.4581	19 40 39.8	10.198	8	21 53 7.00	2.3004	9 23 21.4	14.925
9	20 1 28.97	2.4548	19 30 24.0	10.330	9	21 55 24.94	2.2977	9 8 24.1	14.984
10	20 3 56.16	2.4516	19 20 0.2	10.462	10	21 57 42.72	2.2951	8 53 23.3	15.041
11	20 6 23.16	2.4483	19 9 28.6	10.593	11	22 0 0.35	2.2925	8 38 19.2	15.095
12	20 8 49.95	2.4448	18 58 49.1	10.722	12	22 2 17.82	2.2899	8 23 11.9	15.148
13	20 11 16.54	2.4416	18 48 2.0	10.849	13	22 4 35.14	2.2875	8 8 1.4	15.200
14	20 13 42.94	2.4382	18 37 7.2	10.976	14	22 6 52.32	2.2851	7 52 47.9	15.249
15	20 16 9.12	2.4347	18 26 4.9	11.100	15	22 9 9.35	2.2827	7 37 31.5	15.297
16	20 18 35.10	2.4313	18 14 55.2	11.224	16	22 11 26.24	2.2803	7 22 12.3	15.343
17	20 21 0.88	2.4279	18 3 38.0	11.347	17	22 13 42.99	2.2780	7 6 50.4	15.387
18	20 23 26.45	2.4244	17 52 13.6	11.468	18	22 15 59.60	2.2758	6 51 25.9	15.429
19	20 25 51.81	2.4209	17 40 41.9	11.588	19	22 18 16.08	2.2737	6 35 58.9	15.470
20	20 28 16.96	2.4174	17 29 3.1	11.708	20	22 20 32.44	2.2715	6 20 29.5	15.509
21	20 30 41.90	2.4139	17 17 17.3	11.823	21	22 22 48.66	2.2694	6 4 57.8	15.546
22	20 33 6.63	2.4104	17 5 24.4	11.938	22	22 25 4.77	2.2674	5 49 24.0	15.581
23	20 35 31.15	2.4070	-16 53 24.7	+12.052	23	22 27 20.75	2.2653	- 5 33 48.1	+15.614
MARCH 19.					MARCH 21.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 37 55.47	2.4035	-16 41 18.2	+12.164	0	22 29 36.61	2.2634	- 5 18 10.3	+15.645
1	20 40 19.57	2.3999	16 29 5.0	12.275	1	22 31 52.36	2.2617	5 2 30.7	15.675
2	20 42 43.46	2.3965	16 16 45.2	12.385	2	22 34 8.01	2.2599	4 46 49.3	15.708
3	20 45 7.15	2.3930	16 4 18.8	12.493	3	22 36 23.55	2.2581	4 31 0.3	15.729
4	20 47 30.62	2.3895	15 51 46.0	12.600	4	22 38 38.98	2.2564	4 15 21.8	15.753
5	20 49 53.89	2.3860	15 39 6.8	12.705	5	22 40 54.32	2.2548	3 59 35.9	15.776
6	20 52 16.94	2.3825	15 26 21.4	12.808	6	22 43 9.56	2.2533	3 43 48.7	15.797
7	20 54 39.79	2.3791	15 13 29.8	12.910	7	22 45 24.71	2.2517	3 28 0.3	15.815
8	20 57 2.43	2.3757	15 0 32.2	13.010	8	22 47 39.76	2.2503	3 12 10.9	15.833
9	20 59 24.87	2.3722	14 47 28.6	13.109	9	22 49 54.74	2.2489	2 56 20.4	15.848
10	21 1 47.09	2.3688	14 34 19.1	13.208	10	22 52 9.63	2.2475	2 40 29.2	15.861
11	21 4 9.12	2.3654	14 21 3.7	13.303	11	22 54 24.44	2.2462	2 24 37.1	15.873
12	21 6 30.94	2.3620	14 7 42.8	13.396	12	22 56 39.17	2.2450	2 8 44.4	15.883
13	21 8 52.56	2.3587	13 54 16.2	13.488	13	22 58 53.84	2.2438	1 52 51.2	15.890
14	21 11 13.98	2.3553	13 40 44.2	13.579	14	23 1 8.43	2.2428	1 36 57.6	15.897
15	21 13 35.19	2.3519	13 27 6.7	13.668	15	23 3 22.97	2.2418	1 21 3.6	15.902
16	21 15 56.21	2.3487	13 13 24.0	13.756	16	23 5 37.44	2.2407	1 5 9.4	15.903
17	21 18 17.03	2.3454	12 59 36.0	13.843	17	23 7 51.85	2.2398	0 49 15.2	15.904
18	21 20 37.66	2.3422	12 45 42.9	13.926	18	23 10 6.21	2.2389	0 33 20.9	15.904
19	21 22 58.09	2.3389	12 31 44.9	14.009	19	23 12 20.52	2.2382	0 17 26.7	15.901
20	21 25 18.33	2.3358	12 17 41.9	14.089	20	23 14 34.79	2.2374	- 0 1 32.8	15.897
21	21 27 38.38	2.3327	12 3 34.2	14.168	21	23 16 49.01	2.2366	+ 0 14 20.9	15.891
22	21 29 58.25	2.3295	11 49 21.7	14.247	22	23 19 3.18	2.2360	0 30 14.1	15.882
23	21 32 17.92	2.3263	11 35 4.6	14.322	23	23 21 17.33	2.2355	0 46 6.7	15.872
24	21 34 37.41	2.3233	-11 20 43.1	+14.395	24	23 23 31.44	2.2349	+ 1 1 58.7	+15.861



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 22.					MARCH 24.				
	h m s	s	" ' "	"		h m s	s	" ' "	"
0	23 23 31.44	2.2349	+ 1 1 58.7	+15.861	0	1 11 12.40	2.2690	+12 57 47.1	+13.353
1	23 25 45.52	2.2345	1 17 50.0	15.847	1	1 13 28.59	2.2707	13 11 5.7	13.264
2	23 27 59.58	2.2341	1 33 40.3	15.832	2	1 15 44.88	2.2723	13 24 18.8	13.173
3	23 30 13.61	2.2338	1 49 29.8	15.815	3	1 18 1.27	2.2740	13 37 26.5	13.082
4	23 32 27.63	2.2334	2 5 18.1	15.796	4	1 20 17.76	2.2757	13 50 28.6	12.988
5	23 34 41.62	2.2332	2 21 5.3	15.776	5	1 22 34.35	2.2773	14 3 25.1	12.894
6	23 36 55.61	2.2331	2 36 51.2	15.754	6	1 24 51.04	2.2790	14 16 15.9	12.799
7	23 39 9.59	2.2329	2 52 35.8	15.731	7	1 27 7.83	2.2808	14 29 1.0	12.703
8	23 41 23.56	2.2328	3 8 18.9	15.705	8	1 29 24.73	2.2826	14 41 40.2	12.603
9	23 43 37.53	2.2328	3 24 0.4	15.678	9	1 31 41.74	2.2843	14 54 13.4	12.504
10	23 45 51.50	2.2329	3 39 40.2	15.648	10	1 33 58.85	2.2860	15 6 40.7	12.404
11	23 48 5.48	2.2330	3 55 18.2	15.618	11	1 36 16.06	2.2878	15 19 1.9	12.303
12	23 50 19.46	2.2331	4 10 54.3	15.585	12	1 38 33.38	2.2896	15 31 17.0	12.200
13	23 52 33.45	2.2333	4 26 28.4	15.551	13	1 40 50.81	2.2914	15 43 25.9	12.095
14	23 54 47.46	2.2337	4 42 0.4	15.515	14	1 43 8.35	2.2932	15 55 28.4	11.990
15	23 57 1.49	2.2339	4 57 30.2	15.478	15	1 45 25.99	2.2949	16 7 24.7	11.884
16	23 59 15.53	2.2343	5 12 57.7	15.438	16	1 47 43.74	2.2968	16 19 14.5	11.776
17	0 1 29.60	2.2348	5 28 22.8	15.398	17	1 50 1.60	2.2986	16 30 57.8	11.668
18	0 3 43.70	2.2353	5 43 45.4	15.355	18	1 52 19.57	2.3003	16 42 34.6	11.558
19	0 5 57.83	2.2358	5 59 5.4	15.311	19	1 54 37.64	2.3021	16 54 4.8	11.448
20	0 8 11.99	2.2363	6 14 22.7	15.266	20	1 56 55.82	2.3039	17 5 28.4	11.337
21	0 10 26.18	2.2369	6 29 37.3	15.218	21	1 59 14.11	2.3057	17 16 45.2	11.223
22	0 12 40.42	2.2377	6 44 48.9	15.168	22	2 1 32.50	2.3074	17 27 55.2	11.109
23	0 14 54.70	2.2383	+ 6 59 57.5	+15.118	23	2 3 51.00	2.3093	+17 38 58.3	+10.995
MARCH 23.					MARCH 25.				
	h m s	s	" ' "	"		h m s	s	" ' "	"
0	0 17 9.01	2.2390	+ 7 15 3.1	+15.067	0	2 6 9.61	2.3110	+17 49 54.6	+10.879
1	0 19 23.38	2.2398	7 30 5.5	15.012	1	2 8 28.32	2.3127	18 0 43.8	10.763
2	0 21 37.79	2.2407	7 45 4.5	14.956	2	2 10 47.13	2.3144	18 11 26.1	10.645
3	0 23 52.26	2.2416	8 0 0.2	14.899	3	2 13 6.05	2.3162	18 22 1.2	10.525
4	0 26 6.78	2.2425	8 14 52.4	14.841	4	2 15 25.07	2.3178	18 32 29.1	10.406
5	0 28 21.36	2.2436	8 29 41.1	14.781	5	2 17 44.18	2.3194	18 42 49.9	10.287
6	0 30 36.01	2.2446	8 44 26.1	14.718	6	2 20 3.40	2.3212	18 53 3.5	10.165
7	0 32 50.71	2.2456	8 59 7.3	14.654	7	2 22 22.72	2.3228	19 3 9.7	10.042
8	0 35 5.48	2.2467	9 13 44.6	14.590	8	2 24 42.13	2.3243	19 13 8.5	9.919
9	0 37 20.31	2.2478	9 28 18.1	14.524	9	2 27 1.64	2.3260	19 23 0.0	9.796
10	0 39 35.22	2.2491	9 42 47.5	14.456	10	2 29 21.25	2.3276	19 32 44.0	9.671
11	0 41 50.20	2.2503	9 57 12.8	14.387	11	2 31 40.95	2.3291	19 42 20.5	9.546
12	0 44 5.25	2.2515	10 11 33.9	14.316	12	2 34 0.74	2.3306	19 51 49.5	9.420
13	0 46 20.38	2.2528	10 25 50.7	14.243	13	2 36 20.62	2.3321	20 1 10.9	9.293
14	0 48 35.59	2.2542	10 40 3.1	14.170	14	2 38 40.59	2.3335	20 10 24.6	9.164
15	0 50 50.88	2.2555	10 54 11.1	14.095	15	2 41 0.64	2.3349	20 19 30.6	9.037
16	0 53 6.25	2.2569	11 8 14.5	14.018	16	2 43 20.78	2.3363	20 28 29.0	8.908
17	0 55 21.71	2.2583	11 22 13.2	13.939	17	2 45 41.00	2.3377	20 37 19.5	8.778
18	0 57 37.25	2.2598	11 36 7.2	13.860	18	2 48 1.30	2.3390	20 46 2.3	8.648
19	0 59 52.88	2.2613	11 49 56.4	13.779	19	2 50 21.68	2.3403	20 54 37.2	8.516
20	1 2 8.60	2.2628	12 3 40.7	13.697	20	2 52 42.13	2.3414	21 3 4.2	8.384
21	1 4 24.41	2.2643	12 17 20.0	13.613	21	2 55 2.65	2.3427	21 11 23.3	8.253
22	1 6 40.32	2.2658	12 30 54.2	13.528	22	2 57 23.25	2.3438	21 19 34.5	8.119
23	1 8 56.31	2.2673	12 44 23.3	13.441	23	2 59 43.91	2.3449	21 27 37.6	7.985
24	1 11 12.40	2.2690	+12 57 47.1	+13.353	24	3 2 4.64	2.3460	+21 35 32.7	+ 7.851

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 26.					MARCH 28.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	3 2 4.64	2.3440	+21 35 32.7	+7.851	0	4 54 49.22	2.3265	+25 12 9.9	+1.146
1	3 4 25.43	2.3470	21 43 19.7	7.717	1	4 57 8.75	2.3244	25 13 14.5	1.008
2	3 6 46.28	2.3480	21 50 58.7	7.582	2	4 59 28.15	2.3223	25 14 10.9	0.872
3	3 9 7.19	2.3489	21 58 29.5	7.446	3	5 1 47.42	2.3201	25 14 59.1	0.734
4	3 11 28.15	2.3498	22 5 52.2	7.309	4	5 4 6.56	2.3178	25 15 39.0	0.597
5	3 13 49.16	2.3506	22 13 6.6	7.173	5	5 6 25.56	2.3155	25 16 10.7	0.461
6	3 16 10.22	2.3514	22 20 12.9	7.037	6	5 8 44.42	2.3131	25 16 34.3	0.325
7	3 18 31.33	2.3521	22 27 11.0	6.899	7	5 11 3.13	2.3107	25 16 49.7	0.189
8	3 20 52.47	2.3528	22 34 0.8	6.762	8	5 13 21.70	2.3082	25 16 57.0	+0.054
9	3 23 13.66	2.3533	22 40 42.4	6.623	9	5 15 40.11	2.3055	25 16 56.2	-0.080
10	3 25 34.87	2.3536	22 47 15.6	6.484	10	5 17 58.36	2.3029	25 16 47.4	0.214
11	3 27 56.12	2.3544	22 53 40.5	6.346	11	5 20 16.46	2.3002	25 16 30.5	0.348
12	3 30 17.40	2.3548	22 59 57.1	6.207	12	5 22 34.38	2.2973	25 16 5.6	0.482
13	3 32 38.70	2.3552	23 6 5.3	6.068	13	5 24 52.14	2.2946	25 15 32.7	0.614
14	3 35 0.02	2.3555	23 12 5.2	5.928	14	5 27 9.73	2.2917	25 14 51.9	0.746
15	3 37 21.36	2.3558	23 17 56.6	5.788	15	5 29 27.14	2.2887	25 14 3.2	0.878
16	3 39 42.71	2.3560	23 23 39.7	5.648	16	5 31 44.37	2.2857	25 13 6.6	1.009
17	3 42 4.06	2.3561	23 29 14.4	5.508	17	5 34 1.42	2.2827	25 12 2.1	1.140
18	3 44 25.44	2.3561	23 34 40.6	5.367	18	5 36 18.29	2.2796	25 10 49.8	1.270
19	3 46 46.81	2.3562	23 39 58.4	5.226	19	5 38 34.97	2.2768	25 9 29.7	1.399
20	3 49 8.18	2.3561	23 45 7.7	5.085	20	5 40 51.45	2.2731	25 8 1.9	1.528
21	3 51 29.54	2.3560	23 50 8.6	4.944	21	5 43 7.74	2.2699	25 6 26.3	1.657
22	3 53 50.90	2.3558	23 55 1.0	4.803	22	5 45 23.84	2.2666	25 4 43.1	1.784
23	3 56 12.24	2.3555	+23 59 44.9	+4.662	23	5 47 39.73	2.2632	+25 2 52.2	-1.912
MARCH 27.					MARCH 29.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	3 58 33.56	2.3552	+24 4 20.4	+4.521	0	5 49 55.42	2.2595	+25 0 53.7	-2.038
1	4 0 54.86	2.3548	24 8 47.4	4.378	1	5 52 10.90	2.2563	24 58 47.7	2.163
2	4 3 16.14	2.3543	24 13 5.8	4.237	2	5 54 26.18	2.2528	24 56 34.1	2.289
3	4 5 37.38	2.3538	24 17 15.8	4.095	3	5 56 41.24	2.2492	24 54 13.0	2.413
4	4 7 58.59	2.3533	24 21 17.2	3.953	4	5 58 56.08	2.2456	24 51 44.5	2.538
5	4 10 19.77	2.3526	24 25 10.2	3.813	5	6 1 10.71	2.2420	24 49 8.5	2.661
6	4 12 40.90	2.3518	24 28 54.7	3.671	6	6 3 25.12	2.2383	24 46 25.2	2.783
7	4 15 1.99	2.3510	24 32 30.7	3.528	7	6 5 39.31	2.2346	24 43 34.6	2.906
8	4 17 23.02	2.3501	24 35 58.1	3.387	8	6 7 53.27	2.2308	24 40 36.6	3.027
9	4 19 44.00	2.3492	24 39 17.1	3.247	9	6 10 7.00	2.2270	24 37 31.4	3.147
10	4 22 4.92	2.3482	24 42 27.7	3.105	10	6 12 20.51	2.2232	24 34 19.0	3.267
11	4 24 25.78	2.3470	24 45 29.7	2.963	11	6 14 33.78	2.2193	24 30 59.4	3.387
12	4 26 46.56	2.3458	24 48 23.3	2.823	12	6 16 46.83	2.2155	24 27 32.6	3.505
13	4 29 7.28	2.3447	24 51 8.4	2.682	13	6 18 59.64	2.2115	24 23 58.8	3.623
14	4 31 27.92	2.3433	24 53 45.1	2.541	14	6 21 12.21	2.2075	24 20 17.9	3.740
15	4 33 48.48	2.3420	24 56 13.3	2.400	15	6 23 24.54	2.2036	24 16 30.0	3.857
16	4 36 8.96	2.3405	24 58 33.1	2.260	16	6 25 36.64	2.1996	24 12 35.1	3.972
17	4 38 29.34	2.3390	25 0 44.5	2.120	17	6 27 48.49	2.1954	24 8 33.4	4.087
18	4 40 49.64	2.3375	25 2 47.5	1.980	18	6 30 0.09	2.1914	24 4 24.7	4.201
19	4 43 9.84	2.3358	25 4 42.1	1.840	19	6 32 11.46	2.1873	24 0 9.3	4.314
20	4 45 29.93	2.3340	25 6 28.3	1.701	20	6 34 22.57	2.1832	23 55 47.0	4.427
21	4 47 49.92	2.3323	25 8 6.2	1.563	21	6 36 33.44	2.1790	23 51 18.1	4.538
22	4 50 9.80	2.3304	25 9 35.8	1.423	22	6 38 44.05	2.1748	23 46 42.4	4.651
23	4 52 29.57	2.3285	25 10 57.0	1.284	23	6 40 54.42	2.1708	23 42 0.0	4.761
24	4 54 49.22	2.3265	+25 12 9.9	+1.146	24	6 43 4.54	2.1665	+23 37 11.1	-4.870



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MARCH 30.					APRIL 1.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	6 43 4.54	2.1665	+23 37 11.1	-4.870	0	8 22 11.47	1.9678	+17 51 38.7	-9.232
1	6 45 14.40	2.1623	23 32 15.6	4.979	1	8 24 9.43	1.9643	17 42 22.6	9.303
2	6 47 24.01	2.1581	23 27 13.6	5.088	2	8 26 7.18	1.9607	17 33 2.3	9.375
3	6 49 33.37	2.1538	23 22 5.1	5.195	3	8 28 4.71	1.9571	17 23 37.6	9.447
4	6 51 42.47	2.1496	23 16 50.2	5.302	4	8 30 2.03	1.9536	17 14 8.7	9.516
5	6 53 51.32	2.1453	23 11 28.9	5.408	5	8 31 59.14	1.9500	17 4 35.7	9.585
6	6 55 59.90	2.1409	23 6 1.2	5.513	6	8 33 56.03	1.9466	16 54 58.5	9.654
7	6 58 8.23	2.1368	23 0 27.3	5.617	7	8 35 52.73	1.9432	16 45 17.2	9.723
8	7 0 16.31	2.1324	22 54 47.2	5.721	8	8 37 49.21	1.9398	16 35 31.8	9.790
9	7 2 24.12	2.1281	22 49 0.8	5.824	9	8 39 45.50	1.9364	16 25 42.4	9.856
10	7 4 31.68	2.1238	22 43 8.3	5.926	10	8 41 41.58	1.9331	16 15 49.1	9.921
11	7 6 38.98	2.1195	22 37 9.7	6.027	11	8 43 37.47	1.9298	16 5 51.9	9.987
12	7 8 46.02	2.1152	22 31 5.1	6.127	12	8 45 33.16	1.9266	15 55 50.7	10.051
13	7 10 52.80	2.1109	22 24 54.5	6.228	13	8 47 28.66	1.9234	15 45 45.8	10.114
14	7 12 59.33	2.1066	22 18 37.8	6.327	14	8 49 23.97	1.9203	15 35 37.0	10.178
15	7 15 5.59	2.1023	22 12 15.3	6.424	15	8 51 19.10	1.9173	15 25 24.5	10.239
16	7 17 11.60	2.0979	22 5 46.9	6.522	16	8 53 14.04	1.9141	15 15 8.3	10.300
17	7 19 17.34	2.0936	21 59 12.7	6.618	17	8 55 8.79	1.9111	15 4 48.5	10.361
18	7 21 22.83	2.0894	21 52 32.7	6.714	18	8 57 3.37	1.9082	14 54 25.0	10.422
19	7 23 28.07	2.0851	21 45 47.0	6.809	19	8 58 57.77	1.9053	14 43 57.9	10.481
20	7 25 33.04	2.0808	21 38 55.6	6.903	20	9 0 52.00	1.9024	14 33 27.3	10.540
21	7 27 37.76	2.0765	21 31 58.6	6.997	21	9 2 46.06	1.8996	14 22 53.1	10.598
22	7 29 42.22	2.0722	21 24 56.0	7.090	22	9 4 39.95	1.8968	14 12 15.6	10.654
23	7 31 46.42	2.0679	+21 17 47.8	-7.182	23	9 6 33.67	1.8939	+14 1 34.6	-10.712
MARCH 31.					APRIL 2.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 33 50.37	2.0638	+21 10 34.2	-7.273	0	9 8 27.22	1.8913	+13 50 50.2	-10.768
1	7 35 54.07	2.0596	21 3 15.1	7.363	1	9 10 20.62	1.8887	13 40 2.5	10.823
2	7 37 57.51	2.0553	20 55 50.6	7.453	2	9 12 13.86	1.8861	13 29 11.5	10.877
3	7 40 0.70	2.0511	20 48 20.8	7.542	3	9 14 6.95	1.8835	13 18 17.3	10.931
4	7 42 3.64	2.0469	20 40 45.6	7.630	4	9 15 59.88	1.8810	13 7 19.8	10.984
5	7 44 6.33	2.0428	20 33 5.2	7.718	5	9 17 52.67	1.8786	12 56 19.2	11.036
6	7 46 8.77	2.0386	20 25 19.5	7.804	6	9 19 45.31	1.8762	12 45 15.5	11.088
7	7 48 10.96	2.0344	20 17 28.7	7.889	7	9 21 37.81	1.8738	12 34 8.6	11.139
8	7 50 12.90	2.0303	20 9 32.8	7.974	8	9 23 30.16	1.8714	12 22 58.8	11.189
9	7 52 14.59	2.0262	20 1 31.8	8.058	9	9 25 22.38	1.8693	12 11 45.9	11.240
10	7 54 16.04	2.0222	19 53 25.8	8.142	10	9 27 14.47	1.8670	12 0 30.0	11.288
11	7 56 17.25	2.0181	19 45 14.8	8.224	11	9 29 6.42	1.8648	11 49 11.3	11.337
12	7 58 18.21	2.0140	19 36 58.9	8.306	12	9 30 58.25	1.8628	11 37 49.6	11.385
13	8 0 18.93	2.0101	19 28 38.1	8.388	13	9 32 49.95	1.8608	11 26 25.1	11.432
14	8 2 19.42	2.0062	19 20 12.4	8.468	14	9 34 41.54	1.8588	11 14 57.8	11.478
15	8 4 19.67	2.0022	19 11 41.9	8.548	15	9 36 33.00	1.8568	11 3 27.8	11.523
16	8 6 19.68	1.9982	19 3 6.7	8.627	16	9 38 24.35	1.8548	10 51 55.0	11.568
17	8 8 19.45	1.9943	18 54 26.7	8.705	17	9 40 15.58	1.8530	10 40 19.6	11.613
18	8 10 19.00	1.9905	18 45 42.1	8.783	18	9 42 6.71	1.8513	10 28 41.5	11.657
19	8 12 18.31	1.9866	18 36 52.8	8.859	19	9 43 57.73	1.8495	10 17 0.8	11.699
20	8 14 17.39	1.9828	18 27 59.0	8.935	20	9 45 48.65	1.8478	10 5 17.6	11.741
21	8 16 16.25	1.9791	18 19 0.6	9.011	21	9 47 39.47	1.8462	9 53 31.9	11.783
22	8 18 14.88	1.9753	18 9 57.7	9.085	22	9 49 30.19	1.8446	9 41 43.6	11.824
23	8 20 13.29	1.9716	18 0 50.4	9.158	23	9 51 20.82	1.8431	9 29 53.0	11.864
24	8 22 11.47	1.9678	+17 51 38.7	-9.232	24	9 53 11.36	1.8416	+9 17 59.9	-11.904

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 3.					APRIL 5.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	9 53 11.36	1.8416	+9 17 59.9	-11.904	0	11 20 58.82	1.8388	-0 45 57.0	-12.986
1	9 55 1.81	1.8403	9 6 4.5	11.943	1	11 22 49.19	1.8403	0 58 56.3	12.991
2	9 56 52.19	1.8389	8 54 6.7	11.982	2	11 24 39.65	1.8418	1 11 55.9	12.995
3	9 58 42.48	1.8375	8 42 6.7	12.019	3	11 26 30.20	1.8432	1 24 55.7	12.998
4	10 0 32.69	1.8363	8 30 4.4	12.056	4	11 28 20.83	1.8448	1 37 55.6	13.000
5	10 2 22.84	1.8352	8 18 0.0	12.092	5	11 30 11.57	1.8464	1 50 55.7	13.002
6	10 4 12.91	1.8340	8 5 53.4	12.128	6	11 32 2.40	1.8481	2 3 55.8	13.001
7	10 6 2.92	1.8329	7 53 44.7	12.163	7	11 33 53.34	1.8499	2 16 55.8	13.001
8	10 7 52.86	1.8319	7 41 33.9	12.198	8	11 35 44.39	1.8518	2 29 55.9	13.000
9	10 9 42.75	1.8309	7 29 21.0	12.231	9	11 37 35.55	1.8536	2 42 55.8	12.998
10	10 11 32.57	1.8300	7 17 6.2	12.263	10	11 39 26.82	1.8555	2 55 55.7	12.996
11	10 13 22.35	1.8292	7 4 49.5	12.295	11	11 41 18.21	1.8575	3 8 55.3	12.991
12	10 15 12.07	1.8283	6 52 30.8	12.327	12	11 43 9.72	1.8596	3 21 54.6	12.987
13	10 17 1.75	1.8277	6 40 10.3	12.358	13	11 45 1.36	1.8617	3 34 53.7	12.982
14	10 18 51.39	1.8270	6 27 47.9	12.388	14	11 46 53.12	1.8638	3 47 52.4	12.976
15	10 20 40.99	1.8263	6 15 23.7	12.418	15	11 48 45.02	1.8662	4 0 50.8	12.969
16	10 22 30.55	1.8258	6 2 57.8	12.446	16	11 50 37.06	1.8684	4 13 48.7	12.961
17	10 24 20.08	1.8253	5 50 30.2	12.473	17	11 52 29.23	1.8708	4 26 46.1	12.952
18	10 26 9.58	1.8248	5 38 1.0	12.501	18	11 54 21.55	1.8733	4 39 42.9	12.943
19	10 27 59.06	1.8245	5 25 30.1	12.528	19	11 56 14.02	1.8757	4 52 39.2	12.932
20	10 29 48.52	1.8241	5 12 57.7	12.553	20	11 58 6.63	1.8782	5 5 34.7	12.920
21	10 31 37.95	1.8238	5 0 23.7	12.579	21	11 59 59.40	1.8808	5 18 29.6	12.908
22	10 33 27.37	1.8236	4 47 48.2	12.603	22	12 1 52.33	1.8835	5 31 23.7	12.895
23	10 35 16.78	1.8235	+4 35 11.3	-12.627	23	12 3 45.42	1.8863	-5 44 17.0	-12.881
APRIL 4.					APRIL 6.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	10 37 6.19	1.8234	+4 22 33.0	-12.660	0	12 5 38.68	1.8890	-5 57 9.4	-12.866
1	10 38 55.59	1.8233	4 9 53.3	12.673	1	12 7 32.10	1.8918	6 10 0.9	12.850
2	10 40 44.99	1.8233	3 57 12.3	12.694	2	12 9 25.70	1.8948	6 22 51.4	12.833
3	10 42 34.39	1.8234	3 44 30.0	12.716	3	12 11 19.47	1.8977	6 35 40.8	12.815
4	10 44 23.80	1.8236	3 31 46.4	12.736	4	12 13 13.42	1.9008	6 48 29.2	12.797
5	10 46 13.22	1.8238	3 19 1.7	12.755	5	12 15 7.56	1.9038	7 1 16.4	12.777
6	10 48 2.65	1.8240	3 6 15.8	12.774	6	12 17 1.88	1.9068	7 14 2.4	12.756
7	10 49 52.10	1.8244	2 53 28.8	12.793	7	12 18 56.38	1.9101	7 26 47.1	12.734
8	10 51 41.58	1.8248	2 40 40.7	12.810	8	12 20 51.09	1.9134	7 39 30.5	12.712
9	10 53 31.07	1.8251	2 27 51.6	12.826	9	12 22 45.99	1.9166	7 52 12.5	12.688
10	10 55 20.59	1.8256	2 15 1.6	12.842	10	12 24 41.08	1.9200	8 4 53.1	12.664
11	10 57 10.14	1.8262	2 2 10.6	12.858	11	12 26 36.39	1.9235	8 17 32.2	12.639
12	10 58 59.73	1.8268	1 49 18.7	12.872	12	12 28 31.90	1.9269	8 30 9.8	12.613
13	11 0 49.36	1.8275	1 36 26.0	12.886	13	12 30 27.62	1.9304	8 42 45.7	12.584
14	11 2 39.03	1.8282	1 23 32.4	12.899	14	12 32 23.55	1.9340	8 55 19.9	12.556
15	11 4 28.74	1.8289	1 10 38.1	12.911	15	12 34 19.70	1.9377	9 7 52.4	12.527
16	11 6 18.50	1.8298	0 57 43.1	12.922	16	12 36 16.07	1.9414	9 20 23.1	12.497
17	11 8 8.32	1.8308	0 44 47.5	12.933	17	12 38 12.67	1.9452	9 32 52.0	12.465
18	11 9 58.19	1.8318	0 31 51.2	12.943	18	12 40 9.49	1.9489	9 45 18.9	12.433
19	11 11 48.13	1.8328	0 18 54.3	12.953	19	12 42 6.54	1.9528	9 57 43.9	12.399
20	11 13 38.13	1.8338	+0 5 56.9	12.961	20	12 44 3.82	1.9568	10 10 6.8	12.364
21	11 15 28.19	1.8350	-0 7 1.0	12.968	21	12 46 1.35	1.9608	10 22 27.6	12.328
22	11 17 18.33	1.8363	0 19 59.3	12.975	22	12 47 59.11	1.9647	10 34 46.2	12.292
23	11 19 8.54	1.8374	0 32 58.0	12.981	23	12 49 57.11	1.9688	10 47 2.6	12.255
24	11 20 58.82	1.8388	-0 45 57.0	-12.986	24	12 51 55.36	1.9729	-10 59 16.8	-12.217

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 7.					APRIL 9.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	12 51 55.36	1.9729	-10 59 16.8	-12.217	0	14 32 12.37	2.2180	-19 39 25.0	-8.998
1	12 53 53.86	1.9771	11 11 28.6	12.176	1	14 34 25.62	2.2237	19 48 22.0	8.901
2	12 55 52.61	1.9813	11 23 37.9	12.135	2	14 36 39.21	2.2293	19 57 13.1	8.803
3	12 57 51.61	1.9856	11 35 44.8	12.093	3	14 38 53.13	2.2348	20 5 58.3	8.703
4	12 59 50.88	1.9899	11 47 49.1	12.050	4	14 41 7.39	2.2406	20 14 37.5	8.603
5	13 1 50.40	1.9943	11 59 50.8	12.006	5	14 43 22.00	2.2463	20 23 10.6	8.500
6	13 3 50.19	1.9988	12 11 49.8	11.960	6	14 45 36.94	2.2518	20 31 37.5	8.398
7	13 5 50.25	2.0033	12 23 46.0	11.914	7	14 47 52.22	2.2575	20 39 58.3	8.293
8	13 7 50.58	2.0078	12 35 39.5	11.867	8	14 50 7.84	2.2631	20 48 12.7	8.187
9	13 9 51.18	2.0123	12 47 30.0	11.818	9	14 52 23.79	2.2687	20 56 20.7	8.080
10	13 11 52.06	2.0169	12 59 17.6	11.768	10	14 54 40.08	2.2743	21 4 22.3	7.973
11	13 13 53.21	2.0216	13 11 2.2	11.718	11	14 56 56.70	2.2798	21 12 17.4	7.863
12	13 15 54.65	2.0263	13 22 43.7	11.666	12	14 59 13.65	2.2853	21 20 5.9	7.753
13	13 17 56.37	2.0311	13 34 22.1	11.613	13	15 1 30.94	2.2909	21 27 47.7	7.641
14	13 19 58.38	2.0359	13 45 57.2	11.558	14	15 3 48.56	2.2964	21 35 22.8	7.528
15	13 22 0.68	2.0407	13 57 29.0	11.503	15	15 6 6.51	2.3018	21 42 51.1	7.414
16	13 24 3.26	2.0456	14 8 57.5	11.446	16	15 8 24.78	2.3073	21 50 12.5	7.298
17	13 26 6.15	2.0506	14 20 22.5	11.388	17	15 10 43.38	2.3128	21 57 26.9	7.182
18	13 28 9.33	2.0555	14 31 44.1	11.329	18	15 13 2.31	2.3182	22 4 34.3	7.064
19	13 30 12.81	2.0605	14 43 2.0	11.269	19	15 15 21.56	2.3234	22 11 34.6	6.945
20	13 32 16.59	2.0655	14 54 16.4	11.208	20	15 17 41.12	2.3288	22 18 27.7	6.825
21	13 34 20.67	2.0706	15 5 27.0	11.145	21	15 20 1.01	2.3341	22 25 13.6	6.704
22	13 36 25.06	2.0758	15 16 33.8	11.082	22	15 22 21.21	2.3393	22 31 52.2	6.582
23	13 38 29.76	2.0809	-15 27 36.8	-11.018	23	15 24 41.72	2.3444	-22 38 23.4	-6.458
APRIL 8.					APRIL 10.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	13 40 34.77	2.0861	-15 38 35.9	-10.952	0	15 27 2.54	2.3496	-22 44 47.1	-6.333
1	13 42 40.09	2.0913	15 49 31.0	10.884	1	15 29 23.67	2.3548	22 51 3.4	6.208
2	13 44 45.73	2.0966	16 0 22.0	10.815	2	15 31 45.11	2.3598	22 57 12.0	6.081
3	13 46 51.68	2.1018	16 11 8.8	10.746	3	15 34 6.85	2.3648	23 3 13.1	5.953
4	13 48 57.95	2.1072	16 21 51.5	10.675	4	15 36 28.89	2.3698	23 9 6.4	5.824
5	13 51 4.54	2.1125	16 32 29.8	10.603	5	15 38 51.22	2.3747	23 14 52.0	5.694
6	13 53 11.45	2.1179	16 43 3.8	10.529	6	15 41 13.85	2.3796	23 20 29.7	5.563
7	13 55 18.69	2.1233	16 53 33.3	10.455	7	15 43 36.77	2.3843	23 25 59.5	5.431
8	13 57 26.25	2.1288	17 3 58.4	10.379	8	15 45 59.97	2.3891	23 31 21.4	5.298
9	13 59 34.14	2.1342	17 14 18.8	10.303	9	15 48 23.46	2.3938	23 36 35.2	5.163
10	14 1 42.35	2.1396	17 24 34.7	10.224	10	15 50 47.23	2.3984	23 41 40.9	5.028
11	14 3 50.89	2.1452	17 34 45.7	10.144	11	15 53 11.27	2.4029	23 46 38.6	4.893
12	14 5 59.77	2.1507	17 44 52.0	10.064	12	15 55 35.58	2.4074	23 51 28.0	4.754
13	14 8 8.97	2.1562	17 54 53.4	9.982	13	15 58 0.16	2.4118	23 56 9.1	4.617
14	14 10 18.51	2.1618	18 4 49.8	9.898	14	16 0 25.00	2.4162	24 0 42.0	4.478
15	14 12 28.38	2.1673	18 14 41.2	9.814	15	16 2 50.10	2.4204	24 5 6.4	4.337
16	14 14 38.59	2.1729	18 24 27.5	9.728	16	16 5 15.45	2.4246	24 9 22.4	4.197
17	14 16 49.13	2.1784	18 34 8.6	9.641	17	16 7 41.05	2.4288	24 13 30.0	4.055
18	14 19 0.00	2.1841	18 43 44.4	9.553	18	16 10 6.90	2.4328	24 17 29.0	3.912
19	14 21 11.22	2.1898	18 53 15.0	9.464	19	16 12 32.99	2.4368	24 21 19.4	3.768
20	14 23 22.77	2.1953	19 2 40.1	9.373	20	16 14 59.31	2.4406	24 25 1.1	3.623
21	14 25 34.66	2.2010	19 11 59.7	9.281	21	16 17 25.86	2.4443	24 28 34.2	3.478
22	14 27 46.89	2.2067	19 21 13.8	9.188	22	16 19 52.63	2.4481	24 31 58.5	3.333
23	14 29 59.46	2.2123	19 30 22.2	9.093	23	16 22 19.63	2.4518	24 35 14.1	3.186
24	14 32 12.37	2.2180	-19 39 25.0	-8.998	24	16 24 46.84	2.4553	-24 38 20.8	-3.038

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 11.					APRIL 13.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	16 24 46.84	2.4653	-24 38 20.8	-3.088	0	18 24 45.67	2.5029	-24 5 12.5	+ 4.480
1	16 27 14.26	2.4687	24 41 18.6	2.880	1	18 27 15.80	2.5014	24 0 39.1	4.635
2	16 29 41.88	2.4620	24 44 7.5	2.741	2	18 29 45.84	2.4998	23 55 56.3	4.790
3	16 32 9.70	2.4653	24 46 47.5	2.591	3	18 32 15.77	2.4980	23 51 4.3	4.943
4	16 34 37.71	2.4684	24 49 18.4	2.440	4	18 34 45.60	2.4963	23 46 3.1	5.097
5	16 37 5.91	2.4715	24 51 40.3	2.289	5	18 37 15.32	2.4943	23 40 52.7	5.251
6	16 39 34.29	2.4744	24 53 53.1	2.138	6	18 39 44.92	2.4923	23 35 33.0	5.403
7	16 42 2.84	2.4773	24 55 56.8	1.985	7	18 42 14.39	2.4902	23 30 4.3	5.554
8	16 44 31.56	2.4801	24 57 51.3	1.833	8	18 44 43.74	2.4881	23 24 26.5	5.706
9	16 47 0.45	2.4828	24 59 36.7	1.679	9	18 47 12.96	2.4858	23 18 39.6	5.857
10	16 49 29.49	2.4853	25 1 12.8	1.524	10	18 49 42.04	2.4835	23 12 43.7	6.007
11	16 51 58.68	2.4878	25 2 39.6	1.370	11	18 52 10.98	2.4811	23 6 38.8	6.156
12	16 54 28.02	2.4903	25 3 57.2	1.215	12	18 54 39.77	2.4786	23 0 25.0	6.304
13	16 56 57.50	2.4924	25 5 5.4	1.059	13	18 57 8.41	2.4761	22 54 2.3	6.453
14	16 59 27.11	2.4945	25 6 4.3	0.904	14	18 59 36.90	2.4735	22 47 30.7	6.600
15	17 1 56.84	2.4965	25 6 53.9	0.748	15	19 2 5.23	2.4708	22 40 50.3	6.746
16	17 4 26.69	2.4985	25 7 34.0	0.590	16	19 4 33.40	2.4681	22 34 1.2	6.891
17	17 6 56.66	2.5008	25 8 4.7	0.433	17	19 7 1.40	2.4653	22 27 3.4	7.036
18	17 9 26.73	2.5030	25 8 26.0	0.276	18	19 9 29.23	2.4624	22 19 56.9	7.180
19	17 11 56.90	2.5056	25 8 37.8	-0.118	19	19 11 56.89	2.4595	22 12 41.8	7.323
20	17 14 27.16	2.5082	25 8 40.1	+0.040	20	19 14 24.37	2.4565	22 5 18.2	7.464
21	17 16 57.52	2.5096	25 8 33.0	0.198	21	19 16 51.67	2.4534	21 57 46.1	7.606
22	17 19 27.95	2.5078	25 8 16.3	0.358	22	19 19 18.78	2.4508	21 50 5.5	7.747
23	17 21 58.45	2.5099	-25 7 50.1	+0.516	23	19 21 45.71	2.4473	-21 42 16.5	+ 7.886
APRIL 12.					APRIL 14.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	17 24 29.02	2.5100	-25 7 14.4	+0.675	0	19 24 12.45	2.4440	-21 34 19.2	+ 8.024
1	17 26 59.65	2.5109	25 6 29.1	0.833	1	19 26 38.99	2.4408	21 26 13.6	8.162
2	17 29 30.33	2.5118	25 5 34.4	0.993	2	19 29 5.34	2.4375	21 17 59.8	8.298
3	17 32 1.06	2.5125	25 4 30.0	1.153	3	19 31 31.49	2.4342	21 9 37.9	8.433
4	17 34 31.83	2.5131	25 3 16.1	1.312	4	19 33 57.44	2.4308	21 1 7.9	8.568
5	17 37 2.63	2.5136	25 1 52.6	1.472	5	19 36 23.19	2.4274	20 52 20.8	8.701
6	17 39 33.46	2.5140	25 0 19.5	1.632	6	19 38 48.73	2.4239	20 43 43.8	8.833
7	17 42 4.31	2.5143	24 58 36.8	1.791	7	19 41 14.06	2.4204	20 34 49.8	8.965
8	17 44 35.18	2.5145	24 56 44.6	1.951	8	19 43 39.18	2.4169	20 25 48.0	9.095
9	17 47 6.05	2.5145	24 54 42.7	2.111	9	19 46 4.09	2.4134	20 16 38.4	9.225
10	17 49 36.92	2.5145	24 52 31.3	2.270	10	19 48 28.79	2.4099	20 7 21.0	9.353
11	17 52 7.79	2.5144	24 50 10.3	2.430	11	19 50 53.28	2.4063	19 57 56.0	9.480
12	17 54 38.65	2.5142	24 47 39.7	2.589	12	19 53 17.55	2.4027	19 48 23.4	9.606
13	17 57 9.49	2.5138	24 44 59.6	2.748	13	19 55 41.60	2.3990	19 38 43.3	9.730
14	17 59 40.30	2.5133	24 42 10.0	2.906	14	19 58 5.43	2.3954	19 28 55.8	9.854
15	18 2 11.06	2.5127	24 39 10.9	3.065	15	20 0 29.05	2.3918	19 19 0.8	9.977
16	18 4 41.82	2.5120	24 36 2.2	3.223	16	20 2 52.44	2.3880	19 8 58.6	10.098
17	18 7 12.52	2.5113	24 32 44.1	3.382	17	20 5 15.61	2.3843	18 58 49.1	10.218
18	18 9 43.17	2.5103	24 29 16.4	3.540	18	20 7 38.55	2.3806	18 48 32.5	10.336
19	18 12 13.76	2.5093	24 25 39.3	3.697	19	20 10 1.28	2.3769	18 38 8.8	10.453
20	18 14 44.29	2.5083	24 21 52.8	3.854	20	20 12 23.78	2.3731	18 27 38.1	10.570
21	18 17 14.75	2.5071	24 17 56.8	4.012	21	20 14 46.05	2.3694	18 17 0.4	10.686
22	18 19 45.14	2.5058	24 13 51.4	4.168	22	20 17 8.11	2.3658	18 6 15.8	10.799
23	18 22 15.45	2.5044	24 9 36.7	4.324	23	20 19 29.94	2.3619	17 55 24.5	10.912
24	18 24 45.67	2.5029	-24 5 12.5	+4.480	24	20 21 51.54	2.3582	-17 44 26.4	+11.025

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
APRIL 15.									APRIL 17.								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	20	21	51.54	2.3582	-17	44	26.4	+11.023	0	22	11	10.10	2.2111	-7	12	48.3	+14.748
1	20	24	12.92	2.3545	17	33	21.7	11.133	1	22	13	22.71	2.2092	6	58	2.2	14.789
2	20	26	34.08	2.3508	17	22	10.4	11.242	2	22	15	35.20	2.2073	6	43	13.6	14.829
3	20	28	55.02	2.3471	17	10	52.7	11.349	3	22	17	47.58	2.2055	6	28	22.7	14.868
4	20	31	15.73	2.3433	16	59	28.5	11.456	4	22	19	59.86	2.2038	6	13	29.4	14.906
5	20	33	36.22	2.3397	16	47	58.0	11.561	5	22	22	12.03	2.2021	5	58	34.0	14.941
6	20	35	56.49	2.3360	16	36	21.2	11.664	6	22	24	24.11	2.2005	5	43	36.5	14.976
7	20	38	16.54	2.3323	16	24	38.3	11.767	7	22	26	36.09	2.1989	5	28	36.9	15.008
8	20	40	36.36	2.3286	16	12	49.2	11.868	8	22	28	47.98	2.1974	5	13	35.5	15.039
9	20	42	55.97	2.3251	16	0	54.2	11.967	9	22	30	59.78	2.1959	4	58	32.2	15.069
10	20	45	15.37	2.3214	15	48	53.2	12.066	10	22	33	11.49	2.1946	4	43	27.2	15.098
11	20	47	34.54	2.3177	15	36	46.3	12.163	11	22	35	23.13	2.1933	4	28	20.5	15.124
12	20	49	53.49	2.3142	15	24	33.7	12.258	12	22	37	34.69	2.1921	4	13	12.3	15.149
13	20	52	12.24	2.3107	15	12	15.4	12.352	13	22	39	46.18	2.1910	3	58	2.6	15.173
14	20	54	30.77	2.3071	14	59	51.5	12.444	14	22	41	57.61	2.1898	3	42	51.6	15.194
15	20	56	49.09	2.3036	14	47	22.1	12.536	15	22	44	8.96	2.1888	3	27	39.3	15.215
16	20	59	7.20	2.3002	14	34	47.2	12.627	16	22	46	20.26	2.1878	3	12	25.8	15.234
17	21	1	25.11	2.2968	14	22	6.9	12.715	17	22	48	31.50	2.1869	2	57	11.2	15.252
18	21	3	42.81	2.2933	14	9	21.4	12.802	18	22	50	42.69	2.1861	2	41	55.6	15.268
19	21	6	0.31	2.2899	13	56	30.7	12.888	19	22	52	53.83	2.1853	2	26	39.1	15.282
20	21	8	17.60	2.2865	13	43	34.9	12.973	20	22	55	4.92	2.1846	2	11	21.8	15.294
21	21	10	34.69	2.2833	13	30	34.0	13.056	21	22	57	15.98	2.1839	1	56	3.8	15.306
22	21	12	51.59	2.2800	13	17	28.2	13.137	22	22	59	26.99	2.1833	1	40	45.1	15.316
23	21	15	8.29	2.2767	-13	4	17.6	+13.218	23	23	1	37.97	2.1828	-1	25	25.9	+15.323
APRIL 16.									APRIL 18.								
0	21	17	24.79	2.2735	-12	51	2.1	+13.297	0	23	3	48.93	2.1824	-1	10	6.3	+15.330
1	21	19	41.11	2.2703	12	37	42.0	13.373	1	23	5	59.86	2.1819	0	54	46.3	15.335
2	21	21	57.23	2.2672	12	24	17.3	13.449	2	23	8	10.76	2.1816	0	39	26.1	15.338
3	21	24	13.17	2.2642	12	10	48.1	13.523	3	23	10	21.65	2.1814	0	24	5.8	15.340
4	21	26	28.93	2.2612	11	57	14.5	13.597	4	23	12	32.53	2.1812	-0	8	45.3	15.341
5	21	28	44.51	2.2582	11	43	36.5	13.668	5	23	14	43.39	2.1810	+0	6	35.1	15.339
6	21	30	59.91	2.2553	11	29	54.3	13.738	6	23	16	54.25	2.1810	0	21	55.4	15.337
7	21	33	15.14	2.2523	11	16	7.9	13.807	7	23	19	5.11	2.1809	0	37	15.5	15.332
8	21	35	30.19	2.2494	11	2	17.5	13.874	8	23	21	15.96	2.1810	0	52	35.2	15.326
9	21	37	45.07	2.2467	10	48	23.0	13.940	9	23	23	26.83	2.1812	1	7	54.6	15.319
10	21	39	59.79	2.2439	10	34	24.7	14.004	10	23	25	37.70	2.1813	1	23	13.5	15.310
11	21	42	14.34	2.2413	10	20	22.5	14.068	11	23	27	48.58	2.1815	1	38	31.8	15.299
12	21	44	28.74	2.2386	10	6	16.6	14.128	12	23	29	59.48	2.1818	1	53	49.4	15.288
13	21	46	42.97	2.2359	9	52	7.1	14.188	13	23	32	10.40	2.1823	2	9	6.3	15.274
14	21	48	57.05	2.2334	9	37	54.1	14.246	14	23	34	21.35	2.1827	2	24	22.3	15.258
15	21	51	10.98	2.2310	9	23	37.6	14.303	15	23	36	32.32	2.1831	2	39	37.3	15.242
16	21	53	24.77	2.2285	9	9	17.7	14.358	16	23	38	43.32	2.1837	2	54	51.3	15.224
17	21	55	38.40	2.2261	8	54	54.6	14.413	17	23	40	54.36	2.1843	3	10	4.2	15.204
18	21	57	51.90	2.2238	8	40	28.2	14.465	18	23	43	5.44	2.1850	3	25	15.8	15.183
19	22	0	5.26	2.2215	8	25	58.8	14.515	19	23	45	16.56	2.1858	3	40	26.1	15.159
20	22	2	18.48	2.2193	8	11	26.4	14.565	20	23	47	27.73	2.1865	3	55	34.9	15.135
21	22	4	31.57	2.2172	7	56	51.0	14.613	21	23	49	38.94	2.1873	4	10	42.3	15.109
22	22	6	44.54	2.2151	7	42	12.8	14.659	22	23	51	50.21	2.1883	4	25	48.0	15.081
23	22	8	57.38	2.2130	7	27	31.9	14.704	23	23	54	1.54	2.1893	4	40	52.0	15.053
24	22	11	10.10	2.2111	-7	12	48.3	+14.748	24	23	56	12.92	2.1903	+4	55	54.3	+15.023



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 19.					APRIL 21.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 56 12.92	2.1903	+ 4 55 54.3	+15.023	0	1 43 24.59	2.2891	+15 53 0.9	+11.803
1	23 58 24.37	2.1913	5 10 54.7	14.989	1	1 45 42.02	2.2918	16 4 46.1	11.703
2	0 0 35.88	2.1924	5 25 53.0	14.955	2	1 47 59.60	2.2943	16 16 25.2	11.600
3	0 2 47.46	2.1937	5 40 49.3	14.920	3	1 50 17.34	2.2969	16 27 58.1	11.497
4	0 4 59.12	2.1949	5 55 43.4	14.883	4	1 52 35.23	2.2996	16 39 24.8	11.393
5	0 7 10.85	2.1962	6 10 35.3	14.846	5	1 54 53.29	2.3023	16 50 45.2	11.287
6	0 9 22.66	2.1976	6 25 24.9	14.805	6	1 57 11.50	2.3048	17 1 59.2	11.180
7	0 11 34.56	2.1990	6 40 11.9	14.763	7	1 59 29.86	2.3073	17 13 6.8	11.072
8	0 13 46.54	2.2003	6 54 56.5	14.721	8	2 1 48.38	2.3100	17 24 7.8	10.963
9	0 15 58.60	2.2018	7 9 38.4	14.677	9	2 4 7.06	2.3126	17 35 2.3	10.853
10	0 18 10.76	2.2035	7 24 17.7	14.631	10	2 6 25.89	2.3151	17 45 50.1	10.741
11	0 20 23.02	2.2051	7 38 54.1	14.583	11	2 8 44.87	2.3176	17 56 31.2	10.628
12	0 22 35.37	2.2067	7 53 27.6	14.533	12	2 11 4.00	2.3201	18 7 5.5	10.514
13	0 24 47.82	2.2084	8 7 58.1	14.483	13	2 13 23.28	2.3227	18 17 32.9	10.400
14	0 27 0.38	2.2102	8 22 25.6	14.432	14	2 15 42.72	2.3252	18 27 53.5	10.284
15	0 29 13.04	2.2119	8 36 49.9	14.378	15	2 18 2.30	2.3276	18 38 7.0	10.167
16	0 31 25.81	2.2138	8 51 10.9	14.323	16	2 20 22.03	2.3300	18 48 13.5	10.049
17	0 33 38.69	2.2157	9 5 28.6	14.267	17	2 22 41.90	2.3323	18 58 12.9	9.930
18	0 35 51.69	2.2176	9 19 42.9	14.208	18	2 25 1.91	2.3348	19 8 5.1	9.810
19	0 38 4.80	2.2195	9 33 53.6	14.148	19	2 27 22.07	2.3372	19 17 50.1	9.689
20	0 40 18.03	2.2216	9 48 0.7	14.088	20	2 29 42.37	2.3395	19 27 27.8	9.568
21	0 42 31.39	2.2236	10 2 4.1	14.025	21	2 32 2.81	2.3418	19 36 58.2	9.445
22	0 44 44.86	2.2257	10 16 3.7	13.961	22	2 34 23.38	2.3439	19 46 21.2	9.321
23	0 46 58.47	2.2278	+10 29 59.4	+13.895	23	2 36 44.08	2.3462	+19 55 36.7	+ 9.196
APRIL 20.					APRIL 22.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	0 49 12.20	2.2299	+10 43 51.1	+13.828	0	2 39 4.92	2.3484	+20 4 44.7	+ 9.070
1	0 51 26.06	2.2321	10 57 38.8	13.760	1	2 41 25.89	2.3505	20 13 45.1	8.944
2	0 53 40.05	2.2343	11 11 22.3	13.690	2	2 43 46.98	2.3526	20 22 38.0	8.817
3	0 55 54.18	2.2367	11 25 1.6	13.619	3	2 46 8.20	2.3547	20 31 23.1	8.688
4	0 58 8.45	2.2389	11 38 36.6	13.547	4	2 48 29.54	2.3567	20 40 0.6	8.560
5	1 0 22.85	2.2412	11 52 7.2	13.473	5	2 50 51.00	2.3587	20 48 30.3	8.430
6	1 2 37.39	2.2436	12 5 33.3	13.398	6	2 53 12.58	2.3605	20 56 52.2	8.299
7	1 4 52.08	2.2459	12 18 54.9	13.320	7	2 55 34.26	2.3623	21 5 6.2	8.168
8	1 7 6.90	2.2483	12 32 11.7	13.242	8	2 57 56.06	2.3642	21 13 12.3	8.036
9	1 9 21.87	2.2508	12 45 23.9	13.163	9	3 0 17.96	2.3659	21 21 10.5	7.903
10	1 11 36.99	2.2533	12 58 31.2	13.081	10	3 2 39.97	2.3676	21 29 0.7	7.770
11	1 13 52.26	2.2557	13 11 33.6	12.998	11	3 5 2.07	2.3692	21 36 42.9	7.636
12	1 16 7.67	2.2582	13 24 31.0	12.914	12	3 7 24.27	2.3708	21 44 17.0	7.501
13	1 18 23.24	2.2607	13 37 23.3	12.829	13	3 9 46.57	2.3724	21 51 43.0	7.366
14	1 20 38.95	2.2632	13 50 10.5	12.743	14	3 12 8.96	2.3738	21 59 0.9	7.229
15	1 22 54.82	2.2658	14 2 52.4	12.654	15	3 14 31.43	2.3753	22 6 10.5	7.093
16	1 25 10.84	2.2683	14 15 29.0	12.565	16	3 16 53.99	2.3766	22 13 12.0	6.956
17	1 27 27.02	2.2709	14 28 0.2	12.475	17	3 19 16.62	2.3778	22 20 5.2	6.818
18	1 29 43.35	2.2734	14 40 26.0	12.383	18	3 21 39.33	2.3791	22 26 50.1	6.679
19	1 31 59.83	2.2760	14 52 46.1	12.289	19	3 24 2.11	2.3802	22 33 26.7	6.541
20	1 34 16.47	2.2787	15 5 0.7	12.195	20	3 26 24.95	2.3813	22 39 55.0	6.402
21	1 36 33.27	2.2813	15 17 9.5	12.098	21	3 28 47.86	2.3823	22 46 14.9	6.262
22	1 38 50.22	2.2838	15 29 12.5	12.002	22	3 31 10.82	2.3832	22 52 26.4	6.121
23	1 41 7.33	2.2864	15 41 9.7	11.903	23	3 33 33.84	2.3840	22 58 29.4	5.981
24	1 43 24.59	2.2891	+15 53 0.9	+11.803	24	3 35 56.90	2.3848	+23 4 24.1	+ 5.840

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 23.					APRIL 25.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	3 35 56.90	2.3848	+23 4 24.1	+5.840	0	5 29 46.03	2.3256	+24 59 54.8	-0.973
1	3 38 20.01	2.3855	23 10 10.2	5.698	1	5 32 5.47	2.3224	24 58 52.4	1.107
2	3 40 43.16	2.3862	23 15 47.9	5.557	2	5 34 24.72	2.3192	24 57 42.0	1.242
3	3 43 6.35	2.3868	23 21 17.0	5.414	3	5 36 43.77	2.3158	24 56 23.4	1.374
4	3 45 29.57	2.3872	23 26 37.6	5.272	4	5 39 2.62	2.3124	24 54 57.1	1.505
5	3 47 52.81	2.3875	23 31 49.6	5.129	5	5 41 21.26	2.3090	24 53 22.8	1.638
6	3 50 16.07	2.3878	23 36 53.1	4.987	6	5 43 39.70	2.3055	24 51 40.5	1.771
7	3 52 39.35	2.3882	23 41 48.0	4.843	7	5 45 57.92	2.3018	24 49 50.3	1.901
8	3 55 2.65	2.3883	23 46 34.2	4.699	8	5 48 15.92	2.2982	24 47 52.4	2.031
9	3 57 25.95	2.3883	23 51 11.9	4.556	9	5 50 33.70	2.2945	24 45 46.6	2.161
10	3 59 49.25	2.3883	23 55 40.9	4.412	10	5 52 51.26	2.2908	24 43 33.1	2.289
11	4 2 12.55	2.3883	24 0 1.3	4.268	11	5 55 8.60	2.2870	24 41 11.9	2.418
12	4 4 35.84	2.3881	24 4 13.1	4.124	12	5 57 25.70	2.2831	24 38 43.0	2.545
13	4 6 59.12	2.3878	24 8 16.2	3.980	13	5 59 42.57	2.2792	24 36 6.5	2.671
14	4 9 22.38	2.3875	24 12 10.7	3.835	14	6 1 59.20	2.2752	24 33 22.5	2.797
15	4 11 45.62	2.3871	24 15 56.4	3.691	15	6 4 15.59	2.2712	24 30 30.9	2.922
16	4 14 8.83	2.3865	24 19 33.6	3.547	16	6 6 31.74	2.2671	24 27 31.9	3.046
17	4 16 32.00	2.3859	24 23 2.0	3.402	17	6 8 47.64	2.2629	24 24 25.4	3.170
18	4 18 55.14	2.3853	24 26 21.8	3.258	18	6 11 3.29	2.2588	24 21 11.5	3.293
19	4 21 18.23	2.3845	24 29 32.9	3.113	19	6 13 18.69	2.2546	24 17 50.3	3.415
20	4 23 41.28	2.3837	24 32 35.4	2.969	20	6 15 33.84	2.2503	24 14 21.7	3.537
21	4 26 4.27	2.3827	24 35 29.2	2.825	21	6 17 48.73	2.2461	24 10 45.9	3.657
22	4 28 27.20	2.3817	24 38 14.4	2.681	22	6 20 3.37	2.2418	24 7 2.9	3.776
23	4 30 50.07	2.3806	+24 40 50.9	+2.537	23	6 22 17.74	2.2373	+24 3 12.8	-3.895
APRIL 24.					APRIL 26.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	4 33 12.87	2.3793	+24 43 18.8	+2.393	0	6 24 31.85	2.2329	+23 59 15.5	-4.013
1	4 35 35.59	2.3781	24 45 38.0	2.248	1	6 26 45.69	2.2285	23 55 11.2	4.130
2	4 37 58.24	2.3768	24 47 48.6	2.105	2	6 28 59.27	2.2241	23 50 59.9	4.247
3	4 40 20.80	2.3752	24 49 50.6	1.962	3	6 31 12.58	2.2195	23 46 41.6	4.363
4	4 42 43.26	2.3737	24 51 44.0	1.819	4	6 33 25.61	2.2150	23 42 16.4	4.478
5	4 45 5.64	2.3721	24 53 28.9	1.676	5	6 35 38.38	2.2105	23 37 44.3	4.592
6	4 47 27.91	2.3703	24 55 5.1	1.533	6	6 37 50.87	2.2058	23 33 5.4	4.704
7	4 49 50.08	2.3685	24 56 32.8	1.391	7	6 40 3.08	2.2013	23 28 19.8	4.816
8	4 52 12.13	2.3666	24 57 52.0	1.248	8	6 42 15.02	2.1966	23 23 27.5	4.928
9	4 54 34.07	2.3647	24 59 2.6	1.106	9	6 44 26.67	2.1919	23 18 28.5	5.038
10	4 56 55.89	2.3627	25 0 4.7	0.965	10	6 46 38.05	2.1873	23 13 22.9	5.148
11	4 59 17.59	2.3605	25 0 58.4	0.823	11	6 48 49.15	2.1826	23 8 10.7	5.258
12	5 1 39.15	2.3583	25 1 43.5	0.682	12	6 50 59.96	2.1778	23 2 52.0	5.365
13	5 4 0.58	2.3560	25 2 20.2	0.542	13	6 53 10.49	2.1732	22 57 26.9	5.472
14	5 6 21.87	2.3536	25 2 48.5	0.403	14	6 55 20.74	2.1685	22 51 55.4	5.578
15	5 8 43.01	2.3512	25 3 8.5	0.263	15	6 57 30.71	2.1638	22 46 17.5	5.683
16	5 11 4.01	2.3487	25 3 20.0	+0.123	16	6 59 40.39	2.1589	22 40 33.4	5.788
17	5 13 24.85	2.3460	25 3 23.2	-0.015	17	7 1 49.78	2.1542	22 34 43.0	5.892
18	5 15 45.53	2.3433	25 3 18.2	0.153	18	7 3 58.89	2.1494	22 28 46.4	5.995
19	5 18 6.05	2.3406	25 3 4.8	0.292	19	7 6 7.71	2.1447	22 22 43.6	6.097
20	5 20 26.40	2.3378	25 2 43.2	0.429	20	7 8 16.25	2.1399	22 16 34.8	6.198
21	5 22 46.58	2.3348	25 2 13.3	0.566	21	7 10 24.50	2.1351	22 10 19.9	6.298
22	5 25 6.58	2.3318	25 1 35.3	0.702	22	7 12 32.46	2.1303	22 3 59.1	6.397
23	5 27 26.40	2.3288	25 0 49.1	0.838	23	7 14 40.14	2.1255	21 57 32.3	6.495
24	5 29 46.03	2.3256	+24 59 54.8	-0.973	24	7 16 47.52	2.1207	+21 50 59.7	-6.593

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
APRIL 27.					APRIL 29.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	7 16 47.52	2.1207	+21 50 59.7	-6.593	0	8 53 24.53	1.9168	+14 58 14.8	-10.295
1	7 18 54.62	2.1159	21 44 21.2	6.689	1	8 55 19.43	1.9133	14 47 55.3	10.353
2	7 21 1.43	2.1112	21 37 37.0	6.785	2	8 57 14.13	1.9101	14 37 32.4	10.410
3	7 23 7.96	2.1064	21 30 47.0	6.880	3	8 59 8.64	1.9069	14 27 6.1	10.467
4	7 25 14.20	2.1017	21 23 51.4	6.973	4	9 1 2.96	1.9037	14 16 36.4	10.523
5	7 27 20.16	2.0969	21 16 50.2	7.068	5	9 2 57.08	1.9005	14 6 3.3	10.579
6	7 29 25.83	2.0921	21 9 43.3	7.160	6	9 4 51.02	1.8975	13 55 26.9	10.633
7	7 31 31.21	2.0874	21 2 31.0	7.251	7	9 6 44.78	1.8945	13 44 47.3	10.687
8	7 33 36.32	2.0827	20 55 13.2	7.342	8	9 8 38.36	1.8915	13 34 4.5	10.740
9	7 35 41.14	2.0779	20 47 50.0	7.432	9	9 10 31.76	1.8886	13 23 18.5	10.793
10	7 37 45.67	2.0733	20 40 21.4	7.521	10	9 12 24.99	1.8857	13 12 29.4	10.845
11	7 39 49.93	2.0687	20 32 47.5	7.608	11	9 14 18.04	1.8828	13 1 37.1	10.896
12	7 41 53.91	2.0640	20 25 8.4	7.695	12	9 16 10.93	1.8802	12 50 41.9	10.946
13	7 43 57.61	2.0593	20 17 24.1	7.782	13	9 18 3.66	1.8775	12 39 43.6	10.996
14	7 46 1.03	2.0548	20 9 34.6	7.868	14	9 19 56.23	1.8748	12 28 42.4	11.044
15	7 48 4.18	2.0502	20 1 40.0	7.952	15	9 21 48.64	1.8722	12 17 38.3	11.093
16	7 50 7.05	2.0455	19 53 40.4	8.036	16	9 23 40.89	1.8697	12 6 31.2	11.141
17	7 52 9.64	2.0410	19 45 35.7	8.119	17	9 25 33.00	1.8673	11 55 21.4	11.188
18	7 54 11.97	2.0365	19 37 26.1	8.201	18	9 27 24.96	1.8648	11 44 8.7	11.235
19	7 56 14.02	2.0319	19 29 11.6	8.283	19	9 29 16.77	1.8624	11 32 53.2	11.280
20	7 58 15.80	2.0275	19 20 52.2	8.363	20	9 31 8.45	1.8602	11 21 35.1	11.325
21	8 0 17.32	2.0231	19 12 28.1	8.443	21	9 32 59.99	1.8579	11 10 14.2	11.370
22	8 2 18.57	2.0186	19 3 59.1	8.522	22	9 34 51.40	1.8557	10 58 50.7	11.413
23	8 4 19.55	2.0142	+18 55 25.5	-8.598	23	9 36 42.67	1.8535	+10 47 24.6	-11.457
APRIL 28.					APRIL 30.				
0	8 6 20.27	2.0098	+18 46 47.3	-8.676	0	9 38 33.82	1.8515	+10 35 55.9	-11.499
1	8 8 20.73	2.0056	18 38 4.4	8.753	1	9 40 24.85	1.8495	10 24 24.7	11.541
2	8 10 20.94	2.0013	18 29 16.9	8.828	2	9 42 15.76	1.8475	10 12 51.0	11.583
3	8 12 20.88	1.9970	18 20 25.0	8.903	3	9 44 6.55	1.8456	10 1 14.8	11.623
4	8 14 20.58	1.9928	18 11 28.5	8.978	4	9 45 57.23	1.8438	9 49 36.3	11.663
5	8 16 20.02	1.9886	18 2 27.7	9.050	5	9 47 47.80	1.8420	9 37 55.3	11.703
6	8 18 19.21	1.9844	17 53 22.5	9.123	6	9 49 38.27	1.8403	9 26 12.0	11.741
7	8 20 18.15	1.9803	17 44 12.9	9.195	7	9 51 28.64	1.8387	9 14 26.4	11.778
8	8 22 16.84	1.9763	17 34 59.1	9.265	8	9 53 18.91	1.8370	9 2 38.6	11.816
9	8 24 15.30	1.9723	17 25 41.1	9.335	9	9 55 9.08	1.8355	8 50 48.5	11.853
10	8 26 13.51	1.9682	17 16 18.9	9.405	10	9 56 59.17	1.8341	8 38 56.2	11.889
11	8 28 11.48	1.9642	17 6 52.5	9.473	11	9 58 49.17	1.8326	8 27 1.8	11.924
12	8 30 9.21	1.9603	16 57 22.1	9.541	12	10 0 39.08	1.8313	8 15 5.3	11.959
13	8 32 6.71	1.9564	16 47 47.6	9.608	13	10 2 28.92	1.8300	8 3 6.7	11.993
14	8 34 3.98	1.9526	16 38 9.2	9.673	14	10 4 18.68	1.8288	7 51 6.1	12.027
15	8 36 1.02	1.9488	16 28 26.8	9.740	15	10 6 8.37	1.8277	7 39 3.5	12.059
16	8 37 57.84	1.9451	16 18 40.4	9.804	16	10 7 58.00	1.8266	7 26 59.0	12.092
17	8 39 54.43	1.9413	16 8 50.3	9.868	17	10 9 47.56	1.8255	7 14 52.5	12.124
18	8 41 50.80	1.9377	15 58 56.3	9.932	18	10 11 37.06	1.8245	7 2 44.1	12.155
19	8 43 46.95	1.9340	15 48 58.5	9.994	19	10 13 26.50	1.8236	6 50 33.9	12.185
20	8 45 42.88	1.9305	15 38 57.0	10.055	20	10 15 15.89	1.8228	6 38 21.9	12.215
21	8 47 38.61	1.9270	15 28 51.9	10.116	21	10 17 5.24	1.8220	6 26 8.1	12.244
22	8 49 34.12	1.9234	15 18 43.1	10.177	22	10 18 54.53	1.8213	6 13 52.6	12.273
23	8 51 29.42	1.9201	15 8 30.7	10.236	23	10 20 43.79	1.8207	6 1 35.5	12.299
24	8 53 24.53	1.9168	+14 58 14.8	-10.295	24	10 22 33.01	1.8201	+ 5 49 16.7	-12.327



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 1.					MAY 3.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 22 33.01	1.8201	+5 49 16.7	-12.327	0	11 50 28.13	1.8687	-4 21 15.8	-12.842
1	10 24 22.20	1.8195	5 36 56.3	12.354	1	11 52 20.33	1.8713	4 34 6.1	12.834
2	10 26 11.35	1.8190	5 24 34.2	12.380	2	11 54 12.69	1.8741	4 46 55.9	12.826
3	10 28 0.48	1.8187	5 12 10.7	12.405	3	11 56 5.22	1.8769	4 59 45.2	12.818
4	10 29 49.59	1.8183	4 59 45.6	12.430	4	11 57 57.92	1.8797	5 12 34.0	12.808
5	10 31 38.68	1.8180	4 47 19.1	12.454	5	11 59 50.78	1.8826	5 25 22.1	12.796
6	10 33 27.75	1.8178	4 34 51.1	12.478	6	12 1 43.83	1.8856	5 38 9.5	12.785
7	10 35 16.81	1.8177	4 22 21.8	12.500	7	12 3 37.05	1.8886	5 50 56.3	12.773
8	10 37 5.87	1.8176	4 9 51.1	12.523	8	12 5 30.46	1.8918	6 3 42.2	12.759
9	10 38 54.92	1.8175	3 57 19.1	12.543	9	12 7 24.06	1.8949	6 16 27.4	12.745
10	10 40 43.97	1.8176	3 44 45.9	12.564	10	12 9 17.85	1.8981	6 29 11.6	12.729
11	10 42 33.03	1.8178	3 32 11.4	12.585	11	12 11 11.83	1.9014	6 41 54.9	12.714
12	10 44 22.10	1.8179	3 19 35.7	12.604	12	12 13 6.02	1.9048	6 54 37.3	12.698
13	10 46 11.18	1.8182	3 6 58.9	12.623	13	12 15 0.41	1.9083	7 7 18.6	12.679
14	10 48 0.28	1.8186	2 54 20.9	12.642	14	12 16 55.01	1.9118	7 19 58.8	12.660
15	10 49 49.41	1.8189	2 41 41.9	12.658	15	12 18 49.82	1.9153	7 32 37.8	12.640
16	10 51 38.55	1.8193	2 29 1.9	12.676	16	12 20 44.84	1.9189	7 45 15.6	12.620
17	10 53 27.73	1.8198	2 16 20.8	12.693	17	12 22 40.09	1.9227	7 57 52.2	12.598
18	10 55 16.93	1.8204	2 3 38.8	12.708	18	12 24 35.56	1.9263	8 10 27.4	12.575
19	10 57 6.18	1.8211	1 50 55.9	12.723	19	12 26 31.25	1.9302	8 23 1.2	12.552
20	10 58 55.46	1.8218	1 38 12.1	12.737	20	12 28 27.18	1.9340	8 35 33.6	12.528
21	11 0 44.79	1.8226	1 25 27.5	12.750	21	12 30 23.33	1.9379	8 48 4.5	12.502
22	11 2 34.17	1.8234	1 12 42.1	12.763	22	12 32 19.73	1.9420	9 0 33.8	12.475
23	11 4 23.60	1.8243	+0 59 55.9	-12.775	23	12 34 16.37	1.9460	-9 13 1.5	-12.448
MAY 2.					MAY 4.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 6 13.08	1.8253	+0 47 9.1	-12.786	0	12 36 13.25	1.9501	-9 25 27.6	-12.420
1	11 8 2.63	1.8263	0 34 21.6	12.798	1	12 38 10.38	1.9543	9 37 51.9	12.390
2	11 9 52.24	1.8274	0 21 33.4	12.808	2	12 40 7.77	1.9587	9 50 14.4	12.359
3	11 11 41.92	1.8286	+0 8 44.7	12.817	3	12 42 5.42	1.9629	10 2 35.0	12.328
4	11 13 31.67	1.8298	-0 4 4.6	12.826	4	12 44 3.32	1.9673	10 14 53.7	12.295
5	11 15 21.50	1.8312	0 16 54.4	12.834	5	12 46 1.49	1.9717	10 27 10.4	12.262
6	11 17 11.41	1.8326	0 29 44.7	12.841	6	12 47 59.92	1.9762	10 39 25.1	12.227
7	11 19 1.41	1.8340	0 42 35.3	12.847	7	12 49 58.63	1.9808	10 51 37.6	12.191
8	11 20 51.49	1.8354	0 55 26.3	12.853	8	12 51 57.61	1.9853	11 3 48.0	12.154
9	11 22 41.66	1.8371	1 8 17.7	12.858	9	12 53 56.86	1.9899	11 15 56.1	12.116
10	11 24 31.94	1.8388	1 21 9.3	12.863	10	12 55 56.40	1.9947	11 28 1.9	12.078
11	11 26 22.31	1.8404	1 34 1.2	12.866	11	12 57 56.22	1.9994	11 40 5.4	12.038
12	11 28 12.79	1.8423	1 46 53.2	12.868	12	12 59 56.33	2.0043	11 52 6.4	11.996
13	11 30 3.38	1.8440	1 59 45.4	12.870	13	13 1 56.73	2.0092	12 4 4.9	11.953
14	11 31 54.07	1.8459	2 12 37.6	12.872	14	13 3 57.43	2.0141	12 16 0.8	11.909
15	11 33 44.89	1.8480	2 25 30.0	12.873	15	13 5 58.42	2.0190	12 27 54.0	11.865
16	11 35 35.83	1.8500	2 38 22.3	12.872	16	13 7 59.71	2.0241	12 39 44.6	11.819
17	11 37 26.89	1.8521	2 51 14.6	12.872	17	13 10 1.31	2.0292	12 51 32.3	11.772
18	11 39 18.08	1.8543	3 4 6.9	12.869	18	13 12 3.21	2.0343	13 3 17.2	11.724
19	11 41 9.40	1.8565	3 16 58.9	12.866	19	13 14 5.43	2.0396	13 14 59.2	11.675
20	11 43 0.86	1.8588	3 29 50.8	12.863	20	13 16 7.96	2.0448	13 26 38.2	11.624
21	11 44 52.45	1.8612	3 42 42.5	12.860	21	13 18 10.80	2.0501	13 38 14.1	11.572
22	11 46 44.20	1.8637	3 55 34.0	12.855	22	13 20 13.97	2.0554	13 49 46.8	11.519
23	11 48 36.09	1.8661	4 8 25.1	12.848	23	13 22 17.45	2.0608	14 1 16.4	11.466
24	11 50 28.13	1.8687	-4 21 15.8	-12.842	24	13 24 21.26	2.0663	-14 12 42.7	-11.410

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 5.					MAY 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	13 24 21.26	2.0663	-14 12 42.7	-11.410	0	15 10 21.76	2.3547	-21 51 59.5	-7.209
1	13 26 25.40	2.0717	14 24 5.6	11.353	1	15 12 43.22	2.3606	21 59 8.5	7.089
2	13 28 29.86	2.0772	14 35 25.1	11.296	2	15 15 5.03	2.3664	22 6 10.2	6.967
3	13 30 34.66	2.0828	14 46 41.1	11.237	3	15 17 27.19	2.3722	22 13 4.5	6.843
4	13 32 39.80	2.0884	14 57 53.5	11.177	4	15 19 49.69	2.3778	22 19 51.4	6.719
5	13 34 45.27	2.0940	15 9 2.3	11.115	5	15 22 12.53	2.3836	22 26 30.8	6.593
6	13 36 51.08	2.0998	15 20 7.3	11.052	6	15 24 35.72	2.3892	22 33 2.6	6.466
7	13 38 57.24	2.1055	15 31 8.5	10.988	7	15 26 59.23	2.3948	22 39 26.7	6.338
8	13 41 3.74	2.1112	15 42 5.8	10.923	8	15 29 23.09	2.4003	22 45 43.1	6.208
9	13 43 10.58	2.1170	15 52 59.2	10.857	9	15 31 47.27	2.4057	22 51 51.7	6.078
10	13 45 17.78	2.1229	16 3 48.6	10.788	10	15 34 11.77	2.4111	22 57 52.4	5.946
11	13 47 25.33	2.1287	16 14 33.8	10.718	11	15 36 36.60	2.4164	23 3 45.2	5.813
12	13 49 33.22	2.1346	16 25 14.8	10.648	12	15 39 1.74	2.4217	23 9 29.9	5.678
13	13 51 41.48	2.1406	16 35 51.6	10.577	13	15 41 27.20	2.4269	23 15 6.5	5.543
14	13 53 50.09	2.1465	16 46 24.0	10.503	14	15 43 52.97	2.4321	23 20 35.0	5.407
15	13 55 59.06	2.1525	16 56 52.0	10.429	15	15 46 19.05	2.4372	23 25 55.3	5.268
16	13 58 8.39	2.1586	17 7 15.5	10.353	16	15 48 45.43	2.4421	23 31 7.2	5.129
17	14 0 18.09	2.1646	17 17 34.4	10.277	17	15 51 12.10	2.4470	23 36 10.8	4.989
18	14 2 28.14	2.1707	17 27 48.7	10.198	18	15 53 39.07	2.4518	23 41 5.9	4.848
19	14 4 38.57	2.1768	17 37 58.2	10.118	19	15 56 6.32	2.4565	23 45 52.6	4.707
20	14 6 49.35	2.1828	17 48 2.8	10.037	20	15 58 33.85	2.4612	23 50 30.7	4.563
21	14 9 0.51	2.1890	17 58 2.6	9.954	21	16 1 1.66	2.4658	23 55 0.1	4.418
22	14 11 12.03	2.1951	18 7 57.3	9.870	22	16 3 29.74	2.4702	23 59 20.9	4.273
23	14 13 23.92	2.2013	-18 17 47.0	-9.785	23	16 5 58.08	2.4745	-24 3 32.9	-4.128
MAY 6.					MAY 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 15 36.18	2.2074	-18 27 31.5	-9.698	0	16 8 26.68	2.4788	-24 7 36.2	-3.981
1	14 17 48.81	2.2137	18 37 10.8	9.611	1	16 10 55.54	2.4831	24 11 30.6	3.832
2	14 20 1.82	2.2198	18 46 44.8	9.521	2	16 13 24.65	2.4872	24 15 16.0	3.683
3	14 22 15.19	2.2260	18 56 13.3	9.430	3	16 15 54.00	2.4912	24 18 52.5	3.533
4	14 24 28.94	2.2323	19 5 36.4	9.338	4	16 18 23.59	2.4950	24 22 19.9	3.382
5	14 26 43.07	2.2385	19 14 53.9	9.245	5	16 20 53.40	2.4988	24 25 38.3	3.230
6	14 28 57.56	2.2447	19 24 5.8	9.150	6	16 23 23.44	2.5025	24 28 47.5	3.078
7	14 31 12.43	2.2509	19 33 11.9	9.053	7	16 25 53.70	2.5061	24 31 47.6	2.924
8	14 33 27.67	2.2571	19 42 12.2	8.956	8	16 28 24.17	2.5095	24 34 38.4	2.769
9	14 35 43.28	2.2633	19 51 6.6	8.857	9	16 30 54.84	2.5129	24 37 19.9	2.615
10	14 37 59.27	2.2695	19 59 55.0	8.757	10	16 33 25.72	2.5162	24 39 52.2	2.460
11	14 40 15.62	2.2757	20 8 37.4	8.655	11	16 35 56.78	2.5193	24 42 15.1	2.303
12	14 42 32.35	2.2819	20 17 13.6	8.552	12	16 38 28.03	2.5223	24 44 28.5	2.146
13	14 44 49.45	2.2882	20 25 43.6	8.448	13	16 40 59.46	2.5252	24 46 32.6	1.988
14	14 47 6.93	2.2943	20 34 7.3	8.342	14	16 43 31.05	2.5279	24 48 27.1	1.830
15	14 49 24.77	2.3004	20 42 24.6	8.235	15	16 46 2.81	2.5306	24 50 12.2	1.672
16	14 51 42.98	2.3066	20 50 35.5	8.127	16	16 48 34.72	2.5331	24 51 47.7	1.512
17	14 54 1.56	2.3128	20 58 39.8	8.016	17	16 51 6.78	2.5355	24 53 13.6	1.353
18	14 56 20.51	2.3188	21 6 37.4	7.905	18	16 53 38.98	2.5378	24 54 30.0	1.192
19	14 58 39.82	2.3248	21 14 28.4	7.793	19	16 56 11.31	2.5399	24 55 36.6	1.031
20	15 0 59.49	2.3308	21 22 12.5	7.678	20	16 58 43.77	2.5419	24 56 33.7	0.870
21	15 3 19.52	2.3368	21 29 49.8	7.563	21	17 1 16.34	2.5438	24 57 21.0	0.708
22	15 5 39.91	2.3428	21 37 20.1	7.447	22	17 3 49.03	2.5457	24 57 58.6	0.545
23	15 8 0.66	2.3488	21 44 43.4	7.328	23	17 6 21.82	2.5473	24 58 26.4	0.383
24	15 10 21.76	2.3547	-21 51 59.5	-7.209	24	17 8 54.70	2.5488	-24 58 44.5	-0.220

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 9.					MAY 11.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	17 8 54.70	2.5488	-24 58 44.5	-0.220	0	19 10 38.26	2.4803	-22 3 14.0	+7.361
1	17 11 27.67	2.5503	24 58 52.8	-0.057	1	19 13 6.97	2.4765	21 55 48.1	7.502
2	17 14 0.73	2.5515	24 58 51.3	+0.107	2	19 15 35.44	2.4727	21 48 13.8	7.642
3	17 16 33.85	2.5526	24 58 40.0	0.270	3	19 18 3.69	2.4688	21 40 31.1	7.781
4	17 19 7.04	2.5536	24 58 18.9	0.433	4	19 20 31.69	2.4648	21 32 40.1	7.919
5	17 21 40.28	2.5545	24 57 48.0	0.598	5	19 22 59.46	2.4608	21 24 40.8	8.056
6	17 24 13.58	2.5553	24 57 7.2	0.762	6	19 25 26.98	2.4567	21 16 33.4	8.192
7	17 26 46.91	2.5558	24 56 16.6	0.926	7	19 27 54.26	2.4526	21 8 17.8	8.327
8	17 29 20.28	2.5563	24 55 16.1	1.090	8	19 30 21.29	2.4483	20 59 54.2	8.460
9	17 31 53.67	2.5567	24 54 5.8	1.254	9	19 32 48.06	2.4441	20 51 22.6	8.593
10	17 34 27.08	2.5569	24 52 45.6	1.418	10	19 35 14.58	2.4399	20 42 43.1	8.724
11	17 37 0.50	2.5570	24 51 15.6	1.583	11	19 37 40.85	2.4356	20 33 55.7	8.854
12	17 39 33.92	2.5569	24 49 35.7	1.747	12	19 40 6.85	2.4313	20 25 0.6	8.983
13	17 42 7.33	2.5568	24 47 46.0	1.911	13	19 42 32.60	2.4269	20 15 57.8	9.110
14	17 44 40.74	2.5565	24 45 46.4	2.075	14	19 44 58.08	2.4225	20 6 47.4	9.236
15	17 47 14.11	2.5561	24 43 37.0	2.239	15	19 47 23.30	2.4181	19 57 29.5	9.361
16	17 49 47.47	2.5556	24 41 17.7	2.403	16	19 49 48.25	2.4137	19 48 4.1	9.484
17	17 52 20.78	2.5548	24 38 48.7	2.565	17	19 52 12.94	2.4092	19 38 31.4	9.607
18	17 54 54.05	2.5541	24 36 9.9	2.729	18	19 54 37.35	2.4047	19 28 51.3	9.728
19	17 57 27.27	2.5532	24 33 21.2	2.892	19	19 57 1.50	2.4003	19 19 4.0	9.848
20	18 0 0.43	2.5521	24 30 22.9	3.054	20	19 59 25.38	2.3957	19 9 9.6	9.966
21	18 2 33.52	2.5510	24 27 14.7	3.217	21	20 1 48.98	2.3911	18 59 8.1	10.083
22	18 5 6.55	2.5498	24 23 56.9	3.378	22	20 4 12.31	2.3865	18 48 59.6	10.199
23	18 7 39.49	2.5483	-24 20 29.4	+3.540	23	20 6 35.36	2.3819	-18 38 44.2	+10.313
MAY 10.					MAY 12.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 10 12.35	2.5468	-24 16 52.1	+3.701	0	20 8 58.14	2.3774	-18 28 22.0	+10.426
1	18 12 45.11	2.5452	24 13 5.3	3.861	1	20 11 20.65	2.3728	18 17 53.1	10.538
2	18 15 17.77	2.5434	24 9 8.8	4.021	2	20 13 42.88	2.3683	18 7 17.4	10.648
3	18 17 50.32	2.5416	24 5 2.8	4.180	3	20 16 4.84	2.3637	17 56 35.3	10.757
4	18 20 22.76	2.5397	24 0 47.2	4.339	4	20 18 26.52	2.3591	17 45 46.6	10.865
5	18 22 55.08	2.5376	23 56 22.1	4.498	5	20 20 47.93	2.3546	17 34 51.5	10.971
6	18 25 27.27	2.5354	23 51 47.5	4.655	6	20 23 9.07	2.3500	17 23 50.1	11.076
7	18 27 59.33	2.5331	23 47 3.5	4.812	7	20 25 29.93	2.3454	17 12 42.4	11.179
8	18 30 31.24	2.5308	23 42 10.1	4.968	8	20 27 50.52	2.3409	17 1 28.6	11.281
9	18 33 3.02	2.5283	23 37 7.3	5.124	9	20 30 10.84	2.3363	16 50 8.7	11.382
10	18 35 34.64	2.5257	23 31 55.2	5.279	10	20 32 30.88	2.3318	16 38 42.8	11.482
11	18 38 6.10	2.5229	23 26 33.8	5.434	11	20 34 50.65	2.3273	16 27 10.9	11.579
12	18 40 37.39	2.5202	23 21 3.1	5.588	12	20 37 10.16	2.3229	16 15 33.3	11.675
13	18 43 8.52	2.5173	23 15 23.3	5.740	13	20 39 29.40	2.3184	16 3 49.9	11.770
14	18 45 39.47	2.5143	23 9 34.3	5.892	14	20 41 48.37	2.3139	15 52 0.9	11.863
15	18 48 10.24	2.5113	23 3 36.3	6.043	15	20 44 7.07	2.3095	15 40 6.3	11.956
16	18 50 40.82	2.5082	22 57 29.2	6.193	16	20 46 25.51	2.3052	15 28 6.2	12.047
17	18 53 11.22	2.5050	22 51 13.2	6.342	17	20 48 43.69	2.3008	15 16 0.7	12.136
18	18 55 41.42	2.5017	22 44 48.2	6.490	18	20 51 1.60	2.2964	15 3 49.9	12.223
19	18 58 11.42	2.4983	22 38 14.4	6.638	19	20 53 19.26	2.2922	14 51 33.9	12.310
20	19 0 41.22	2.4948	22 31 31.7	6.784	20	20 55 36.66	2.2878	14 39 12.7	12.395
21	19 3 10.80	2.4913	22 24 40.3	6.930	21	20 57 53.80	2.2836	14 26 46.5	12.478
22	19 5 40.18	2.4878	22 17 40.1	7.074	22	21 0 10.69	2.2794	14 14 15.3	12.561
23	19 8 9.33	2.4840	22 10 31.4	7.218	23	21 2 27.33	2.2753	14 1 39.2	12.642
24	19 10 38.26	2.4803	-22 3 14.0	+7.361	24	21 4 43.72	2.2712	-13 48 58.3	+12.721

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 13.					MAY 15.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 4 43.72	2.2712	-13 48 58.3	+12.721	0	22 49 59.47	2.1389	-2 34 14.2	+14.853
1	21 6 59.87	2.2671	13 36 12.7	12.798	1	22 52 7.77	2.1378	2 19 22.7	14.863
2	21 9 15.77	2.2630	13 23 22.5	12.874	2	22 54 16.00	2.1367	2 4 30.6	14.873
3	21 11 31.43	2.2590	13 10 27.8	12.949	3	22 56 24.17	2.1358	1 49 38.0	14.881
4	21 13 46.85	2.2550	12 57 28.6	13.023	4	22 58 32.29	2.1348	1 34 44.9	14.887
5	21 16 2.03	2.2512	12 44 25.1	13.094	5	23 0 40.35	2.1339	1 19 51.6	14.891
6	21 18 16.99	2.2473	12 31 17.3	13.165	6	23 2 48.36	2.1333	1 4 58.0	14.895
7	21 20 31.71	2.2434	12 18 5.3	13.234	7	23 4 56.34	2.1326	0 50 4.2	14.898
8	21 22 46.20	2.2397	12 4 49.2	13.303	8	23 7 4.27	2.1319	0 35 10.3	14.898
9	21 25 0.47	2.2360	11 51 29.0	13.369	9	23 9 12.17	2.1313	0 20 16.4	14.898
10	21 27 14.52	2.2323	11 38 4.9	13.433	10	23 11 20.03	2.1308	-0 5 22.6	14.895
11	21 29 28.35	2.2287	11 24 37.0	13.497	11	23 13 27.87	2.1305	+0 9 31.0	14.892
12	21 31 41.96	2.2251	11 11 5.3	13.559	12	23 15 35.69	2.1302	0 24 24.4	14.888
13	21 33 55.36	2.2216	10 57 29.9	13.619	13	23 17 43.49	2.1299	0 39 17.5	14.883
14	21 36 8.55	2.2182	10 43 51.0	13.678	14	23 19 51.28	2.1297	0 54 10.3	14.875
15	21 38 21.54	2.2148	10 30 8.5	13.737	15	23 21 59.05	2.1296	1 9 2.5	14.866
16	21 40 34.32	2.2114	10 16 22.6	13.793	16	23 24 6.83	2.1296	1 23 54.2	14.856
17	21 42 46.91	2.2082	10 2 33.4	13.847	17	23 26 14.60	2.1295	1 38 45.2	14.845
18	21 44 59.30	2.2049	9 48 41.0	13.901	18	23 28 22.37	2.1297	1 53 35.6	14.833
19	21 47 11.50	2.2018	9 34 45.3	13.953	19	23 30 30.16	2.1298	2 8 25.1	14.818
20	21 49 23.51	2.1987	9 20 46.6	14.003	20	23 32 37.95	2.1300	2 23 13.7	14.803
21	21 51 35.34	2.1957	9 6 44.9	14.053	21	23 34 45.76	2.1303	2 38 1.4	14.787
22	21 53 46.99	2.1927	8 52 40.3	14.100	22	23 36 53.59	2.1308	2 52 48.1	14.768
23	21 55 58.46	2.1898	- 8 38 32.9	+14.147	23	23 39 1.45	2.1313	+3 7 33.6	+14.748
MAY 14.					MAY 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 58 9.76	2.1869	- 8 24 22.7	+14.192	0	23 41 9.34	2.1318	+3 22 17.9	+14.728
1	22 0 20.89	2.1841	8 10 9.9	14.235	1	23 43 17.26	2.1323	3 37 0.9	14.706
2	22 2 31.85	2.1814	7 55 54.5	14.278	2	23 45 25.21	2.1329	3 51 42.6	14.683
3	22 4 42.66	2.1788	7 41 36.6	14.318	3	23 47 33.21	2.1337	4 6 22.8	14.658
4	22 6 53.30	2.1761	7 27 16.3	14.358	4	23 49 41.25	2.1343	4 21 1.5	14.632
5	22 9 3.79	2.1736	7 12 53.7	14.396	5	23 51 49.33	2.1352	4 35 38.6	14.605
6	22 11 14.13	2.1712	6 58 28.8	14.433	6	23 53 57.47	2.1362	4 50 14.1	14.576
7	22 13 24.33	2.1688	6 44 1.8	14.468	7	23 56 5.67	2.1371	5 4 47.7	14.545
8	22 15 34.39	2.1665	6 29 32.7	14.501	8	23 58 13.92	2.1381	5 19 19.5	14.514
9	22 17 44.31	2.1642	6 15 1.7	14.533	9	0 0 22.24	2.1392	5 33 49.4	14.483
10	22 19 54.09	2.1620	6 0 28.7	14.565	10	0 2 30.62	2.1403	5 48 17.3	14.448
11	22 22 3.75	2.1599	5 45 53.9	14.594	11	0 4 39.08	2.1416	6 2 43.2	14.413
12	22 24 13.28	2.1578	5 31 17.4	14.623	12	0 6 47.61	2.1428	6 17 6.8	14.375
13	22 26 22.69	2.1559	5 16 39.2	14.649	13	0 8 56.22	2.1442	6 31 28.2	14.338
14	22 28 31.99	2.1540	5 1 59.5	14.674	14	0 11 4.91	2.1456	6 45 47.3	14.298
15	22 30 41.17	2.1521	4 47 18.3	14.698	15	0 13 13.69	2.1471	7 0 4.0	14.258
16	22 32 50.24	2.1503	4 32 35.7	14.721	16	0 15 22.56	2.1486	7 14 18.2	14.216
17	22 34 59.21	2.1487	4 17 51.8	14.743	17	0 17 31.52	2.1501	7 28 29.9	14.173
18	22 37 8.08	2.1471	4 3 6.6	14.763	18	0 19 40.57	2.1518	7 42 38.9	14.128
19	22 39 16.86	2.1456	3 48 20.3	14.781	19	0 21 49.73	2.1535	7 56 45.2	14.083
20	22 41 25.55	2.1441	3 33 32.9	14.798	20	0 23 58.99	2.1553	8 10 48.7	14.034
21	22 43 34.15	2.1426	3 18 44.5	14.814	21	0 26 8.36	2.1570	8 24 49.3	13.986
22	22 45 42.66	2.1413	3 3 55.2	14.828	22	0 28 17.83	2.1588	8 38 47.0	13.936
23	22 47 51.10	2.1401	2 49 5.1	14.842	23	0 30 27.42	2.1608	8 52 41.6	13.883
24	22 49 59.47	2.1389	- 2 34 14.2	+14.853	24	0 32 37.13	2.1628	+9 6 33.0	+13.831

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 17.					MAY 19.				
	h m s	s	" ' "	"		h m s	s	" ' "	"
0	0 32 37.13	2.1628	+ 9 6 33.0	+13.831	0	2 19 24.06	2.2946	+18 45 30.0	+9.821
1	0 34 46.96	2.1648	9 20 21.3	13.778	1	2 21 41.82	2.2975	18 55 15.9	9.708
2	0 36 56.90	2.1668	9 34 6.3	13.723	2	2 23 59.76	2.3004	19 4 55.0	9.595
3	0 39 6.97	2.1689	9 47 48.0	13.666	3	2 26 17.87	2.3033	19 14 27.3	9.481
4	0 41 17.17	2.1711	10 1 26.2	13.608	4	2 28 36.15	2.3061	19 23 52.7	9.366
5	0 43 27.50	2.1733	10 15 0.9	13.548	5	2 30 54.60	2.3090	19 33 11.2	9.250
6	0 45 37.97	2.1756	10 28 32.0	13.488	6	2 33 13.23	2.3118	19 42 22.7	9.133
7	0 47 48.57	2.1778	10 41 59.5	13.427	7	2 35 32.02	2.3145	19 51 27.1	9.013
8	0 49 59.30	2.1802	10 55 23.2	13.363	8	2 37 50.97	2.3173	20 0 24.3	8.894
9	0 52 10.19	2.1826	11 8 43.0	13.298	9	2 40 10.10	2.3201	20 9 14.4	8.775
10	0 54 21.21	2.1849	11 21 59.0	13.233	10	2 42 29.38	2.3227	20 17 57.3	8.654
11	0 56 32.38	2.1874	11 35 11.0	13.167	11	2 44 48.82	2.3253	20 26 32.9	8.532
12	0 58 43.70	2.1899	11 48 19.0	13.098	12	2 47 8.42	2.3280	20 35 1.1	8.409
13	1 0 55.17	2.1925	12 1 22.8	13.028	13	2 49 28.18	2.3306	20 43 22.0	8.286
14	1 3 6.80	2.1951	12 14 22.4	12.958	14	2 51 48.09	2.3331	20 51 35.4	8.161
15	1 5 18.58	2.1977	12 27 17.7	12.886	15	2 54 8.15	2.3356	20 59 41.3	8.036
16	1 7 30.52	2.2003	12 40 8.7	12.813	16	2 56 28.36	2.3380	21 7 39.7	7.911
17	1 9 42.62	2.2030	12 52 55.2	12.737	17	2 58 48.71	2.3403	21 15 30.6	7.783
18	1 11 54.88	2.2058	13 5 37.1	12.661	18	3 1 9.20	2.3428	21 23 13.7	7.655
19	1 14 7.31	2.2085	13 18 14.5	12.585	19	3 3 29.84	2.3451	21 30 49.2	7.528
20	1 16 19.90	2.2113	13 30 47.3	12.506	20	3 5 50.61	2.3473	21 38 17.0	7.398
21	1 18 32.66	2.2140	13 43 15.2	12.426	21	3 8 11.51	2.3494	21 45 36.9	7.268
22	1 20 45.58	2.2168	13 55 38.4	12.346	22	3 10 32.54	2.3515	21 52 49.1	7.138
23	1 22 58.68	2.2197	+14 7 56.7	+12.263	23	3 12 53.69	2.3536	+21 59 53.4	+7.006
MAY 18.					MAY 20.				
	h m s	s	" ' "	"		h m s	s	" ' "	"
0	1 25 11.94	2.2225	+14 20 10.0	+12.180	0	3 15 14.97	2.3557	+22 6 49.8	+6.874
1	1 27 25.38	2.2255	14 32 18.3	12.095	1	3 17 36.37	2.3576	22 13 38.3	6.741
2	1 29 39.00	2.2284	14 44 21.4	12.008	2	3 19 57.88	2.3594	22 20 18.7	6.608
3	1 31 52.79	2.2313	14 56 19.3	11.922	3	3 22 19.50	2.3613	22 26 51.2	6.474
4	1 34 6.76	2.2343	15 8 12.0	11.833	4	3 24 41.23	2.3630	22 33 15.6	6.339
5	1 36 20.90	2.2373	15 19 59.3	11.743	5	3 27 3.06	2.3647	22 39 31.9	6.203
6	1 38 35.23	2.2403	15 31 41.2	11.653	6	3 29 24.99	2.3663	22 45 40.0	6.068
7	1 40 49.73	2.2432	15 43 17.6	11.561	7	3 31 47.01	2.3678	22 51 40.1	5.933
8	1 43 4.41	2.2463	15 54 48.5	11.468	8	3 34 9.13	2.3693	22 57 31.9	5.795
9	1 45 19.28	2.2493	16 6 13.7	11.373	9	3 36 31.33	2.3707	23 3 15.5	5.658
10	1 47 34.32	2.2523	16 17 33.3	11.278	10	3 38 53.61	2.3720	23 8 50.8	5.520
11	1 49 49.55	2.2553	16 28 47.1	11.181	11	3 41 15.97	2.3733	23 14 17.9	5.382
12	1 52 4.96	2.2583	16 39 55.0	11.083	12	3 43 38.40	2.3744	23 19 36.6	5.243
13	1 54 20.55	2.2614	16 50 57.0	10.984	13	3 46 0.90	2.3755	23 24 47.0	5.104
14	1 56 36.33	2.2644	17 1 53.1	10.884	14	3 48 23.46	2.3765	23 29 49.1	4.965
15	1 58 52.28	2.2674	17 12 43.1	10.783	15	3 50 46.08	2.3775	23 34 42.8	4.824
16	2 1 8.42	2.2705	17 23 27.0	10.680	16	3 53 8.76	2.3783	23 39 28.0	4.684
17	2 3 24.74	2.2736	17 34 4.7	10.577	17	3 55 31.48	2.3790	23 44 4.9	4.544
18	2 5 41.25	2.2766	17 44 36.2	10.472	18	3 57 54.24	2.3798	23 48 33.3	4.403
19	2 7 57.93	2.2796	17 55 1.3	10.366	19	4 0 17.05	2.3803	23 52 53.2	4.262
20	2 10 14.80	2.2826	18 5 20.1	10.259	20	4 2 39.88	2.3808	23 57 4.7	4.121
21	2 12 31.84	2.2856	18 15 32.4	10.151	21	4 5 2.75	2.3813	24 1 7.7	3.979
22	2 14 49.07	2.2886	18 25 38.2	10.042	22	4 7 25.64	2.3816	24 5 2.2	3.837
23	2 17 6.47	2.2916	18 35 37.4	9.932	23	4 9 48.54	2.3818	24 8 48.1	3.694
24	2 19 24.06	2.2946	+18 45 30.0	+9.821	24	4 12 11.45	2.3819	+24 12 25.5	+3.553



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 21.					MAY 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	4 12 11.45	2.3819	+24 12 25.5	+3.553	0	6 4 59.01	2.2849	+24 21 1.2	-3.058
1	4 14 34.37	2.3821	24 15 54.4	3.410	1	6 7 15.99	2.2810	24 17 53.9	3.184
2	4 16 57.30	2.3821	24 19 14.7	3.268	2	6 9 32.73	2.2770	24 14 39.1	3.309
3	4 19 20.22	2.3819	24 22 26.5	3.125	3	6 11 49.23	2.2730	24 11 16.8	3.433
4	4 21 43.13	2.3817	24 25 29.7	2.983	4	6 14 5.49	2.2689	24 7 47.1	3.557
5	4 24 6.02	2.3813	24 28 24.4	2.840	5	6 16 21.50	2.2648	24 4 10.0	3.679
6	4 26 28.89	2.3810	24 31 10.5	2.697	6	6 18 37.26	2.2606	24 0 25.6	3.801
7	4 28 51.74	2.3805	24 33 48.0	2.553	7	6 20 52.77	2.2563	23 56 33.9	3.922
8	4 31 14.55	2.3799	24 36 16.9	2.411	8	6 23 8.02	2.2520	23 52 35.0	4.042
9	4 33 37.33	2.3793	24 38 37.3	2.268	9	6 25 23.01	2.2477	23 48 28.9	4.161
10	4 36 0.06	2.3785	24 40 49.1	2.126	10	6 27 37.74	2.2433	23 44 15.7	4.278
11	4 38 22.75	2.3777	24 42 52.4	1.983	11	6 29 52.21	2.2388	23 39 55.5	4.396
12	4 40 45.38	2.3767	24 44 47.0	1.839	12	6 32 6.40	2.2343	23 35 28.2	4.513
13	4 43 7.95	2.3757	24 46 33.1	1.698	13	6 34 20.33	2.2299	23 30 53.9	4.628
14	4 45 30.46	2.3746	24 48 10.7	1.555	14	6 36 33.99	2.2253	23 26 12.8	4.743
15	4 47 52.90	2.3733	24 49 39.7	1.413	15	6 38 47.37	2.2208	23 21 24.7	4.858
16	4 50 15.26	2.3720	24 51 0.3	1.272	16	6 41 0.48	2.2162	23 16 29.8	4.971
17	4 52 37.54	2.3706	24 52 12.3	1.129	17	6 43 13.31	2.2115	23 11 28.2	5.083
18	4 54 59.73	2.3691	24 53 15.8	0.988	18	6 45 25.86	2.2068	23 6 19.9	5.194
19	4 57 21.83	2.3676	24 54 10.8	0.847	19	6 47 38.13	2.2022	23 1 4.9	5.305
20	4 59 43.84	2.3658	24 54 57.4	0.706	20	6 49 50.12	2.1974	22 55 43.3	5.415
21	5 2 5.73	2.3640	24 55 35.5	0.565	21	6 52 1.82	2.1927	22 50 15.1	5.523
22	5 4 27.52	2.3622	24 56 5.2	0.424	22	6 54 13.24	2.1879	22 44 40.5	5.631
23	5 6 49.19	2.3602	+24 56 26.4	+0.284	23	6 56 24.37	2.1831	+22 38 59.4	-5.738
MAY 22.					MAY 24.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	5 9 10.74	2.3582	+24 56 39.3	+0.145	0	6 58 35.21	2.1783	+22 33 11.9	-5.844
1	5 11 32.17	2.3560	24 56 43.8	+0.005	1	7 0 45.76	2.1734	22 27 18.1	5.949
2	5 13 53.46	2.3538	24 56 39.9	-0.134	2	7 2 56.02	2.1686	22 21 18.0	6.053
3	5 16 14.62	2.3515	24 56 27.7	0.272	3	7 5 5.99	2.1638	22 15 11.7	6.156
4	5 18 35.64	2.3491	24 56 7.3	0.410	4	7 7 15.67	2.1589	22 8 59.3	6.258
5	5 20 56.51	2.3467	24 55 38.5	0.548	5	7 9 25.06	2.1540	22 2 40.7	6.360
6	5 23 17.24	2.3441	24 55 1.5	0.685	6	7 11 34.15	2.1490	21 56 16.1	6.460
7	5 25 37.80	2.3414	24 54 16.3	0.823	7	7 13 42.94	2.1442	21 49 45.5	6.560
8	5 27 58.21	2.3387	24 53 22.8	0.959	8	7 15 51.45	2.1393	21 43 8.9	6.659
9	5 30 18.44	2.3358	24 52 21.2	1.094	9	7 17 59.65	2.1343	21 36 26.4	6.757
10	5 32 38.51	2.3330	24 51 11.5	1.229	10	7 20 7.57	2.1294	21 29 38.1	6.853
11	5 34 58.40	2.3301	24 49 53.7	1.364	11	7 22 15.18	2.1244	21 22 44.1	6.948
12	5 37 18.12	2.3271	24 48 27.8	1.498	12	7 24 22.50	2.1195	21 15 44.3	7.044
13	5 39 37.05	2.3238	24 46 53.9	1.633	13	7 26 29.52	2.1146	21 8 38.8	7.138
14	5 41 56.98	2.3207	24 45 11.9	1.766	14	7 28 36.25	2.1098	21 1 27.7	7.231
15	5 44 16.13	2.3174	24 43 22.0	1.898	15	7 30 42.69	2.1048	20 54 11.1	7.323
16	5 46 35.07	2.3140	24 41 24.2	2.029	16	7 32 48.83	2.0998	20 46 49.0	7.414
17	5 48 53.81	2.3107	24 39 18.5	2.160	17	7 34 54.67	2.0949	20 39 21.4	7.505
18	5 51 12.35	2.3073	24 37 5.0	2.291	18	7 37 0.22	2.0901	20 31 48.4	7.594
19	5 53 30.68	2.3037	24 34 43.6	2.421	19	7 39 5.48	2.0852	20 24 10.1	7.683
20	5 55 48.79	2.3000	24 32 14.5	2.549	20	7 41 10.44	2.0803	20 16 26.5	7.770
21	5 58 6.68	2.2963	24 29 37.7	2.678	21	7 43 15.11	2.0754	20 8 37.7	7.856
22	6 0 24.35	2.2927	24 26 53.1	2.807	22	7 45 19.49	2.0706	20 0 43.8	7.942
23	6 2 41.80	2.2888	24 24 0.9	2.933	23	7 47 23.58	2.0658	19 52 44.7	8.027
24	6 4 59.01	2.2849	+24 21 1.2	-3.058	24	7 49 27.38	2.0609	+19 44 40.6	-8.110

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 25.					MAY 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 49 27.38	2.0609	+19 44 40.6	-8.110	0	9 23 25.00	1.8701	+11 55 9.7	-11.143
1	7 51 30.89	2.0562	19 36 31.5	8.193	1	9 25 17.12	1.8673	11 43 59.8	11.187
2	7 53 34.12	2.0514	19 28 17.4	8.275	2	9 27 9.08	1.8646	11 32 47.3	11.230
3	7 55 37.06	2.0466	19 19 58.5	8.356	3	9 29 0.87	1.8619	11 21 32.2	11.273
4	7 57 39.71	2.0418	19 11 34.7	8.437	4	9 30 52.51	1.8593	11 10 14.5	11.316
5	7 59 42.08	2.0372	19 3 6.1	8.516	5	9 32 43.99	1.8567	10 58 54.3	11.358
6	8 1 44.17	2.0325	18 54 32.8	8.595	6	9 34 35.31	1.8542	10 47 31.6	11.398
7	8 3 45.98	2.0278	18 45 54.7	8.673	7	9 36 26.49	1.8518	10 36 6.5	11.438
8	8 5 47.51	2.0232	18 37 12.1	8.748	8	9 38 17.52	1.8493	10 24 39.0	11.478
9	8 7 48.76	2.0185	18 28 24.9	8.824	9	9 40 8.41	1.8470	10 13 9.1	11.518
10	8 9 49.73	2.0139	18 19 33.2	8.900	10	9 41 59.16	1.8448	10 1 36.9	11.555
11	8 11 50.43	2.0094	18 10 36.9	8.974	11	9 43 49.78	1.8426	9 50 2.5	11.593
12	8 13 50.86	2.0049	18 1 36.3	9.047	12	9 45 40.27	1.8404	9 38 25.8	11.630
13	8 15 51.02	2.0004	17 52 31.3	9.119	13	9 47 30.63	1.8383	9 26 46.9	11.666
14	8 17 50.91	1.9959	17 43 22.0	9.190	14	9 49 20.87	1.8363	9 15 5.9	11.702
15	8 19 50.53	1.9915	17 34 8.5	9.261	15	9 51 10.99	1.8343	9 3 22.7	11.738
16	8 21 49.89	1.9872	17 24 50.7	9.332	16	9 53 0.99	1.8323	8 51 37.4	11.772
17	8 23 48.99	1.9828	17 15 28.7	9.400	17	9 54 50.87	1.8305	8 39 50.1	11.805
18	8 25 47.83	1.9785	17 6 2.7	9.468	18	9 56 40.65	1.8288	8 28 0.8	11.838
19	8 27 46.41	1.9743	16 56 32.6	9.535	19	9 58 30.33	1.8270	8 16 9.5	11.871
20	8 29 44.74	1.9701	16 46 58.5	9.602	20	10 0 19.89	1.8253	8 4 16.3	11.903
21	8 31 42.82	1.9658	16 37 20.4	9.668	21	10 2 9.37	1.8238	7 52 21.2	11.934
22	8 33 40.64	1.9616	16 27 38.4	9.732	22	10 3 58.75	1.8223	7 40 24.2	11.965
23	8 35 38.21	1.9575	+16 17 52.6	-9.796	23	10 5 48.05	1.8209	+7 28 25.4	-11.994
MAY 26.					MAY 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	8 37 35.54	1.9535	+16 8 2.9	-9.859	0	10 7 37.26	1.8195	+7 16 24.9	-12.023
1	8 39 32.63	1.9494	15 58 9.5	9.921	1	10 9 26.39	1.8182	7 4 22.6	12.052
2	8 41 29.47	1.9454	15 48 12.4	9.983	2	10 11 15.44	1.8168	6 52 18.7	12.080
3	8 43 26.08	1.9415	15 38 11.6	10.044	3	10 13 4.41	1.8157	6 40 13.0	12.108
4	8 45 22.45	1.9376	15 28 7.1	10.104	4	10 14 53.32	1.8146	6 28 5.8	12.134
5	8 47 18.59	1.9338	15 17 59.1	10.163	5	10 16 42.16	1.8135	6 15 56.9	12.161
6	8 49 14.50	1.9299	15 7 47.6	10.221	6	10 18 30.94	1.8125	6 3 46.5	12.186
7	8 51 10.18	1.9262	14 57 32.6	10.278	7	10 20 19.66	1.8116	5 51 34.6	12.212
8	8 53 5.64	1.9225	14 47 14.2	10.335	8	10 22 8.33	1.8108	5 39 21.1	12.236
9	8 55 0.88	1.9188	14 36 52.4	10.392	9	10 23 56.95	1.8099	5 27 6.3	12.259
10	8 56 55.90	1.9152	14 26 27.2	10.447	10	10 25 45.52	1.8092	5 14 50.0	12.283
11	8 58 50.70	1.9117	14 15 58.8	10.501	11	10 27 34.05	1.8085	5 2 32.4	12.305
12	9 0 45.30	1.9082	14 5 27.1	10.555	12	10 29 22.54	1.8079	4 50 13.4	12.327
13	9 2 39.68	1.9047	13 54 52.2	10.608	13	10 31 11.00	1.8073	4 37 53.2	12.348
14	9 4 33.86	1.9013	13 44 14.2	10.660	14	10 32 59.42	1.8069	4 25 31.6	12.369
15	9 6 27.83	1.8979	13 33 33.0	10.712	15	10 34 47.83	1.8065	4 13 8.9	12.388
16	9 8 21.61	1.8947	13 22 48.8	10.763	16	10 36 36.21	1.8062	4 0 45.0	12.408
17	9 10 15.19	1.8913	13 12 1.5	10.813	17	10 38 24.57	1.8059	3 48 19.9	12.428
18	9 12 8.57	1.8881	13 1 11.3	10.862	18	10 40 12.92	1.8058	3 35 53.7	12.446
19	9 14 1.76	1.8850	12 50 18.1	10.911	19	10 42 1.26	1.8056	3 23 26.4	12.463
20	9 15 54.77	1.8820	12 39 22.0	10.958	20	10 43 49.59	1.8055	3 10 58.1	12.480
21	9 17 47.60	1.8789	12 28 23.1	11.005	21	10 45 37.92	1.8056	2 58 28.8	12.497
22	9 19 40.24	1.8759	12 17 21.4	11.052	22	10 47 26.26	1.8057	2 45 58.5	12.513
23	9 21 32.71	1.8730	12 6 16.9	11.098	23	10 49 14.60	1.8058	2 33 27.3	12.528
24	9 23 25.00	1.8701	+11 55 9.7	-11.143	24	10 51 2.96	1.8061	+2 20 55.2	-12.542

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
MAY 29.					MAY 31.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 51 2.96	1.8061	+2 20 55.2	-12.542	0	12 19 20.08	1.8999	-7 45 27.6	-12.453
1	10 52 51.33	1.8063	2 8 22.3	12.556	1	12 21 14.19	1.9037	7 57 54.1	12.433
2	10 54 39.72	1.8067	1 55 48.5	12.570	2	12 23 8.52	1.9074	8 10 19.4	12.411
3	10 56 28.13	1.8071	1 43 13.9	12.583	3	12 25 3.08	1.9113	8 22 43.4	12.389
4	10 58 16.57	1.8076	1 30 38.6	12.594	4	12 26 57.87	1.9152	8 35 6.1	12.366
5	11 0 5.04	1.8082	1 18 2.6	12.605	5	12 28 52.90	1.9192	8 47 27.3	12.341
6	11 1 53.55	1.8088	1 5 26.0	12.616	6	12 30 48.17	1.9233	8 59 47.0	12.317
7	11 3 42.10	1.8095	0 52 48.7	12.627	7	12 32 43.69	1.9273	9 12 5.3	12.292
8	11 5 30.69	1.8103	0 40 10.8	12.637	8	12 34 39.45	1.9316	9 24 22.0	12.264
9	11 7 19.34	1.8112	0 27 32.3	12.645	9	12 36 35.48	1.9358	9 36 37.0	12.236
10	11 9 8.03	1.8120	0 14 53.4	12.653	10	12 38 31.75	1.9402	9 48 50.3	12.208
11	11 10 56.78	1.8131	+0 2 13.9	12.661	11	12 40 28.30	1.9446	10 1 1.9	12.178
12	11 12 45.60	1.8142	-0 10 25.9	12.668	12	12 42 25.10	1.9490	10 13 11.7	12.148
13	11 14 34.48	1.8153	0 23 6.2	12.674	13	12 44 22.18	1.9536	10 25 19.7	12.117
14	11 16 23.43	1.8165	0 35 46.8	12.680	14	12 46 19.53	1.9582	10 37 25.7	12.084
15	11 18 12.46	1.8178	0 48 27.8	12.685	15	12 48 17.16	1.9628	10 49 29.8	12.051
16	11 20 1.56	1.8191	1 1 9.0	12.689	16	12 50 15.07	1.9676	11 1 31.8	12.016
17	11 21 50.75	1.8206	1 13 50.5	12.693	17	12 52 13.27	1.9723	11 13 31.7	11.981
18	11 23 40.03	1.8220	1 26 32.2	12.697	18	12 54 11.75	1.9773	11 25 29.5	11.944
19	11 25 29.39	1.8235	1 39 14.1	12.698	19	12 56 10.54	1.9822	11 37 25.0	11.907
20	11 27 18.85	1.8252	1 51 56.0	12.700	20	12 58 9.61	1.9871	11 49 18.3	11.868
21	11 29 8.41	1.8269	2 4 38.1	12.702	21	13 0 8.99	1.9923	12 1 9.2	11.828
22	11 30 58.08	1.8287	2 17 20.2	12.702	22	13 2 8.68	1.9974	12 12 57.7	11.788
23	11 32 47.85	1.8305	-2 30 2.3	-12.701	23	13 4 8.68	2.0026	-12 24 43.8	-11.746
MAY 30.					JUNE 1.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 34 37.74	1.8325	-2 42 44.3	-12.700	0	13 6 8.99	2.0078	-12 36 27.2	-11.703
1	11 36 27.75	1.8344	2 55 26.3	12.698	1	13 8 9.62	2.0131	12 48 8.1	11.659
2	11 38 17.87	1.8365	3 8 8.1	12.696	2	13 10 10.56	2.0185	12 59 46.3	11.613
3	11 40 8.13	1.8387	3 20 49.8	12.693	3	13 12 11.84	2.0240	13 11 21.7	11.568
4	11 41 58.51	1.8408	3 33 31.2	12.689	4	13 14 13.44	2.0294	13 22 54.4	11.521
5	11 43 49.03	1.8431	3 46 12.5	12.685	5	13 16 15.37	2.0349	13 34 24.2	11.472
6	11 45 39.68	1.8454	3 58 53.4	12.678	6	13 18 17.63	2.0406	13 45 51.0	11.423
7	11 47 30.48	1.8479	4 11 33.9	12.673	7	13 20 20.24	2.0463	13 57 14.9	11.372
8	11 49 21.43	1.8503	4 24 14.1	12.667	8	13 22 23.18	2.0519	14 8 35.6	11.320
9	11 51 12.52	1.8528	4 36 53.9	12.659	9	13 24 26.47	2.0578	14 19 53.3	11.267
10	11 53 3.77	1.8556	4 49 33.2	12.651	10	13 26 30.11	2.0636	14 31 7.6	11.212
11	11 54 55.19	1.8583	5 2 12.0	12.642	11	13 28 34.10	2.0694	14 42 18.7	11.158
12	11 56 46.76	1.8610	5 14 50.2	12.632	12	13 30 38.44	2.0753	14 53 26.5	11.101
13	11 58 38.51	1.8639	5 27 27.8	12.621	13	13 32 43.14	2.0814	15 4 30.8	11.043
14	12 0 30.43	1.8668	5 40 4.7	12.610	14	13 34 48.21	2.0874	15 15 31.6	10.983
15	12 2 22.53	1.8698	5 52 41.0	12.598	15	13 36 53.63	2.0934	15 26 28.7	10.923
16	12 4 14.80	1.8728	6 5 16.5	12.585	16	13 38 59.42	2.0997	15 37 22.3	10.862
17	12 6 7.27	1.8760	6 17 51.2	12.571	17	13 41 5.59	2.1058	15 48 12.1	10.798
18	12 7 59.92	1.8792	6 30 25.0	12.557	18	13 43 12.12	2.1121	15 58 58.0	10.733
19	12 9 52.77	1.8825	6 42 58.0	12.542	19	13 45 19.04	2.1183	16 9 40.1	10.668
20	12 11 45.82	1.8858	6 55 30.0	12.525	20	13 47 26.32	2.1247	16 20 18.2	10.602
21	12 13 39.07	1.8893	7 8 1.0	12.508	21	13 49 34.00	2.1311	16 30 52.3	10.534
22	12 15 32.53	1.8928	7 20 31.0	12.491	22	13 51 42.05	2.1374	16 41 22.3	10.464
23	12 17 26.20	1.8963	7 32 59.9	12.472	23	13 53 50.49	2.1439	16 51 48.0	10.393
24	12 19 20.08	1.8999	-7 45 27.6	-12.452	24	13 55 59.32	2.1504	-17 2 9.5	-10.322



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 2.					JUNE 4.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	13 55 59.32	2.1504	-17 2 9.5	-10.322	0	15 46 57.51	2.4684	-23 27 49.0	-5.198
1	13 58 8.54	2.1569	17 12 26.6	10.248	1	15 49 25.79	2.4742	23 32 56.7	5.058
2	14 0 18.15	2.1634	17 22 39.2	10.173	2	15 51 54.41	2.4799	23 37 55.9	4.915
3	14 2 28.15	2.1700	17 32 47.3	10.097	3	15 54 23.38	2.4856	23 42 46.5	4.772
4	14 4 38.55	2.1767	17 42 50.8	10.019	4	15 56 52.68	2.4910	23 47 28.5	4.627
5	14 6 49.35	2.1833	17 52 49.6	9.940	5	15 59 22.30	2.4964	23 52 1.7	4.481
6	14 9 0.55	2.1900	18 2 43.6	9.860	6	16 1 52.25	2.5018	23 56 26.2	4.333
7	14 11 12.15	2.1968	18 12 32.8	9.779	7	16 4 22.52	2.5071	24 0 41.7	4.185
8	14 13 24.16	2.2034	18 22 17.1	9.696	8	16 6 53.10	2.5123	24 4 48.4	4.036
9	14 15 36.56	2.2102	18 31 56.3	9.611	9	16 9 23.99	2.5173	24 8 46.0	3.885
10	14 17 49.38	2.2170	18 41 30.4	9.525	10	16 11 55.18	2.5223	24 12 34.6	3.733
11	14 20 2.60	2.2238	18 50 59.3	9.438	11	16 14 26.66	2.5271	24 16 14.0	3.580
12	14 22 16.23	2.2306	19 0 23.0	9.350	12	16 16 58.43	2.5319	24 19 44.2	3.426
13	14 24 30.27	2.2374	19 9 41.3	9.259	13	16 19 30.49	2.5365	24 23 5.1	3.271
14	14 26 44.72	2.2443	19 18 54.1	9.168	14	16 22 2.81	2.5410	24 26 16.7	3.116
15	14 28 59.58	2.2511	19 28 1.4	9.075	15	16 24 35.41	2.5455	24 29 19.0	2.958
16	14 31 14.85	2.2580	19 37 3.1	8.980	16	16 27 8.27	2.5498	24 32 11.7	2.800
17	14 33 30.54	2.2649	19 45 59.0	8.884	17	16 29 41.39	2.5540	24 34 55.0	2.642
18	14 35 46.64	2.2718	19 54 49.2	8.788	18	16 32 14.75	2.5580	24 37 28.7	2.482
19	14 38 3.15	2.2786	20 3 33.5	8.688	19	16 34 48.35	2.5619	24 39 52.8	2.321
20	14 40 20.07	2.2855	20 12 11.8	8.588	20	16 37 22.18	2.5658	24 42 7.2	2.160
21	14 42 37.41	2.2924	20 20 44.1	8.487	21	16 39 56.24	2.5694	24 44 12.0	1.998
22	14 44 55.16	2.2993	20 29 10.2	8.384	22	16 42 30.51	2.5730	24 46 6.9	1.834
23	14 47 13.32	2.3062	-20 37 30.2	-8.279	23	16 45 5.00	2.5764	-24 47 52.1	-1.671
JUNE 3.					JUNE 5.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 49 31.90	2.3131	-20 45 43.7	-8.173	0	16 47 39.68	2.5797	-24 49 27.4	-1.506
1	14 51 50.89	2.3199	20 53 50.9	8.066	1	16 50 14.56	2.5828	24 50 52.8	1.341
2	14 54 10.29	2.3267	21 1 51.6	7.957	2	16 52 49.62	2.5859	24 52 8.3	1.175
3	14 56 30.09	2.3335	21 9 45.7	7.847	3	16 55 24.87	2.5888	24 53 13.8	1.008
4	14 58 50.31	2.3403	21 17 33.2	7.735	4	16 58 0.27	2.5914	24 54 9.3	0.842
5	15 1 10.93	2.3472	21 25 13.9	7.621	5	17 0 35.84	2.5941	24 54 54.8	0.674
6	15 3 31.97	2.3539	21 32 47.7	7.507	6	17 3 11.56	2.5966	24 55 30.2	0.505
7	15 5 53.40	2.3606	21 40 14.7	7.391	7	17 5 47.43	2.5988	24 55 55.4	0.337
8	15 8 15.24	2.3673	21 47 34.6	7.273	8	17 8 23.42	2.6010	24 56 10.6	-0.168
9	15 10 37.48	2.3740	21 54 47.4	7.153	9	17 10 59.55	2.6031	24 56 15.6	+0.003
10	15 13 0.12	2.3807	22 1 53.0	7.033	10	17 13 35.79	2.6049	24 56 10.3	0.173
11	15 15 23.16	2.3873	22 8 51.3	6.910	11	17 16 12.14	2.6066	24 55 54.9	0.342
12	15 17 46.59	2.3938	22 15 42.2	6.787	12	17 18 48.58	2.6082	24 55 29.3	0.513
13	15 20 10.41	2.4003	22 22 25.7	6.663	13	17 21 25.12	2.6097	24 54 53.4	0.683
14	15 22 34.63	2.4068	22 29 1.7	6.537	14	17 24 1.74	2.6110	24 54 7.3	0.854
15	15 24 59.23	2.4133	22 35 30.1	6.409	15	17 26 38.44	2.6121	24 53 10.9	1.026
16	15 27 24.22	2.4196	22 41 50.8	6.280	16	17 29 15.19	2.6130	24 52 4.2	1.198
17	15 29 49.58	2.4259	22 48 3.7	6.149	17	17 31 52.00	2.6139	24 50 47.2	1.369
18	15 32 15.33	2.4323	22 54 8.7	6.017	18	17 34 28.86	2.6147	24 49 19.9	1.541
19	15 34 41.45	2.4383	23 0 5.7	5.884	19	17 37 5.76	2.6152	24 47 42.3	1.712
20	15 37 7.93	2.4445	23 5 54.8	5.750	20	17 39 42.68	2.6155	24 45 54.5	1.883
21	15 39 34.79	2.4506	23 11 35.7	5.614	21	17 42 19.62	2.6158	24 43 56.3	2.056
22	15 42 2.00	2.4566	23 17 8.5	5.477	22	17 44 56.57	2.6159	24 41 47.8	2.227
23	15 44 29.58	2.4626	23 22 32.9	5.338	23	17 47 33.53	2.6158	24 39 29.1	2.398
24	15 46 57.51	2.4684	-23 27 49.0	-5.198	24	17 50 10.47	2.6156	-24 37 0.0	+2.570

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 6.					JUNE 8.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	17 50 10.47	2.6156	-24 37 0.0	+2.570	0	19 53 3.94	2.4663	-19 27 33.9	+ 9.947
1	17 52 47.40	2.6153	24 34 20.7	2.741	1	19 55 31.77	2.4613	19 17 33.3	10.072
2	17 55 24.30	2.6148	24 31 31.1	2.913	2	19 57 59.30	2.4563	19 7 25.3	10.194
3	17 58 1.17	2.6142	24 28 31.2	3.083	3	20 0 26.52	2.4512	18 57 10.0	10.316
4	18 0 38.00	2.6133	24 25 21.1	3.253	4	20 2 53.44	2.4461	18 46 47.4	10.437
5	18 3 14.77	2.6124	24 22 0.9	3.423	5	20 5 20.05	2.4409	18 36 17.6	10.555
6	18 5 51.49	2.6113	24 18 30.4	3.593	6	20 7 46.35	2.4358	18 25 40.8	10.672
7	18 8 28.13	2.6102	24 14 49.7	3.763	7	20 10 12.35	2.4307	18 14 57.0	10.787
8	18 11 4.71	2.6088	24 10 58.9	3.931	8	20 12 38.03	2.4254	18 4 6.4	10.901
9	18 13 41.19	2.6073	24 6 58.0	4.099	9	20 15 3.40	2.4203	17 53 8.9	11.013
10	18 16 17.59	2.6058	24 2 47.0	4.267	10	20 17 28.46	2.4151	17 42 4.8	11.123
11	18 18 53.88	2.6040	23 58 26.0	4.434	11	20 19 53.21	2.4099	17 30 54.1	11.233
12	18 21 30.07	2.6022	23 53 54.9	4.601	12	20 22 17.65	2.4047	17 19 36.9	11.340
13	18 24 6.14	2.6001	23 49 13.9	4.767	13	20 24 41.77	2.3994	17 8 13.3	11.446
14	18 26 42.08	2.5979	23 44 22.9	4.933	14	20 27 5.58	2.3943	16 56 43.5	11.549
15	18 29 17.89	2.5957	23 39 22.0	5.097	15	20 29 29.08	2.3891	16 45 7.4	11.653
16	18 31 53.56	2.5933	23 34 11.3	5.261	16	20 31 52.27	2.3839	16 33 25.2	11.753
17	18 34 29.08	2.5908	23 28 50.7	5.424	17	20 34 15.15	2.3787	16 21 37.0	11.853
18	18 37 4.45	2.5882	23 23 20.4	5.586	18	20 36 37.71	2.3735	16 9 42.9	11.949
19	18 39 39.66	2.5854	23 17 40.4	5.748	19	20 38 59.97	2.3683	15 57 43.1	12.045
20	18 42 14.70	2.5825	23 11 50.7	5.908	20	20 41 21.91	2.3632	15 45 37.5	12.140
21	18 44 49.56	2.5795	23 5 51.4	6.068	21	20 43 43.55	2.3581	15 33 26.3	12.233
22	18 47 24.24	2.5765	22 59 42.5	6.227	22	20 46 4.88	2.3529	15 21 9.5	12.324
23	18 49 58.74	2.5733	-22 53 24.2	+6.384	23	20 48 25.90	2.3478	-15 8 47.4	+12.413
JUNE 7.					JUNE 9.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	18 52 33.04	2.5700	-22 46 56.4	+6.542	0	20 50 46.61	2.3427	-14 56 20.0	+12.500
1	18 55 7.14	2.5666	22 40 19.2	6.698	1	20 53 7.02	2.3377	14 43 47.4	12.586
2	18 57 41.03	2.5630	22 33 32.6	6.853	2	20 55 27.13	2.3327	14 31 9.7	12.670
3	19 0 14.70	2.5594	22 26 36.8	7.007	3	20 57 46.94	2.3278	14 18 27.0	12.753
4	19 2 48.16	2.5558	22 19 31.8	7.159	4	21 0 6.46	2.3228	14 5 39.3	12.834
5	19 5 21.39	2.5520	22 12 17.7	7.311	5	21 2 25.67	2.3178	13 52 46.9	12.913
6	19 7 54.40	2.5482	22 4 54.5	7.462	6	21 4 44.59	2.3129	13 39 49.7	12.992
7	19 10 27.17	2.5441	21 57 22.3	7.611	7	21 7 3.22	2.3081	13 26 47.9	13.068
8	19 12 59.69	2.5401	21 49 41.2	7.759	8	21 9 21.56	2.3033	13 13 41.6	13.143
9	19 15 31.98	2.5360	21 41 51.2	7.906	9	21 11 39.61	2.2985	13 0 30.8	13.216
10	19 18 4.01	2.5318	21 33 52.5	8.051	10	21 13 57.38	2.2938	12 47 15.7	13.287
11	19 20 35.79	2.5274	21 25 45.1	8.195	11	21 16 14.86	2.2891	12 33 56.4	13.356
12	19 23 7.30	2.5230	21 17 29.1	8.338	12	21 18 32.07	2.2845	12 20 33.0	13.423
13	19 25 38.55	2.5187	21 9 4.5	8.480	13	21 20 49.00	2.2798	12 7 5.6	13.490
14	19 28 9.54	2.5142	21 0 31.5	8.621	14	21 23 5.65	2.2752	11 53 34.2	13.555
15	19 30 40.25	2.5096	20 51 50.0	8.760	15	21 25 22.02	2.2707	11 39 59.0	13.618
16	19 33 10.69	2.5050	20 43 0.3	8.897	16	21 27 38.13	2.2663	11 26 20.0	13.680
17	19 35 40.85	2.5004	20 34 2.4	9.033	17	21 29 53.98	2.2619	11 12 37.4	13.739
18	19 38 10.74	2.4957	20 24 56.3	9.168	18	21 32 9.56	2.2575	10 58 51.3	13.798
19	19 40 40.33	2.4908	20 15 42.2	9.302	19	21 34 24.88	2.2532	10 45 1.6	13.855
20	19 43 9.64	2.4860	20 6 20.1	9.434	20	21 36 39.94	2.2490	10 31 8.7	13.909
21	19 45 38.65	2.4812	19 56 50.1	9.564	21	21 38 54.76	2.2448	10 17 12.5	13.963
22	19 48 7.38	2.4763	19 47 12.4	9.693	22	21 41 9.32	2.2406	10 3 13.1	14.016
23	19 50 35.81	2.4713	19 37 26.9	9.821	23	21 43 23.63	2.2366	9 49 10.6	14.066
24	19 53 3.94	2.4663	-19 27 33.9	+9.947	24	21 45 37.71	2.2327	- 9 35 5.2	+14.114

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 10.					JUNE 12.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 45 37.71	2.2327	-9 35 5.2	+14.114	0	23 29 27.87	2.1219	+2 10 22.6	+14.738
1	21 47 51.55	2.2287	9 20 56.9	14.162	1	23 31 35.17	2.1213	2 25 6.3	14.718
2	21 50 5.15	2.2248	9 6 45.8	14.208	2	23 33 42.43	2.1209	2 39 48.7	14.696
3	21 52 18.52	2.2209	8 52 32.0	14.252	3	23 35 49.68	2.1206	2 54 29.8	14.673
4	21 54 31.66	2.2172	8 38 15.6	14.294	4	23 37 56.90	2.1203	3 9 9.4	14.648
5	21 56 44.58	2.2135	8 23 56.7	14.336	5	23 40 4.11	2.1201	3 23 47.6	14.623
6	21 58 57.28	2.2098	8 9 35.3	14.376	6	23 42 11.31	2.1199	3 38 24.2	14.597
7	22 1 9.76	2.2063	7 55 11.6	14.413	7	23 44 18.50	2.1198	3 52 59.2	14.569
8	22 3 22.03	2.2028	7 40 45.7	14.449	8	23 46 25.69	2.1199	4 7 32.5	14.540
9	22 5 34.09	2.1993	7 26 17.7	14.484	9	23 48 32.89	2.1200	4 22 4.0	14.509
10	22 7 45.95	2.1959	7 11 47.6	14.518	10	23 50 40.09	2.1201	4 36 33.6	14.478
11	22 9 57.60	2.1926	6 57 15.5	14.550	11	23 52 47.30	2.1203	4 51 1.4	14.445
12	22 12 9.06	2.1894	6 42 41.6	14.580	12	23 54 54.52	2.1206	5 5 27.0	14.410
13	22 14 20.33	2.1863	6 28 5.9	14.609	13	23 57 1.77	2.1210	5 19 50.6	14.376
14	22 16 31.42	2.1833	6 13 28.5	14.637	14	23 59 9.04	2.1213	5 34 12.1	14.339
15	22 18 42.32	2.1802	5 58 49.5	14.663	15	0 1 16.33	2.1218	5 48 31.3	14.301
16	22 20 53.04	2.1772	5 44 8.9	14.688	16	0 3 23.66	2.1225	6 2 48.2	14.263
17	22 23 3.58	2.1743	5 29 26.9	14.711	17	0 5 31.03	2.1231	6 17 2.8	14.223
18	22 25 13.96	2.1716	5 14 43.6	14.732	18	0 7 38.43	2.1237	6 31 14.9	14.181
19	22 27 24.17	2.1688	4 59 59.1	14.753	19	0 9 45.87	2.1245	6 45 24.5	14.139
20	22 29 34.22	2.1661	4 45 13.3	14.772	20	0 11 53.37	2.1253	6 59 31.6	14.095
21	22 31 44.10	2.1635	4 30 26.5	14.788	21	0 14 0.91	2.1263	7 13 35.9	14.050
22	22 33 53.84	2.1611	4 15 38.7	14.805	22	0 16 8.51	2.1272	7 27 37.6	14.005
23	22 36 3.43	2.1585	-4 0 49.9	+14.819	23	0 18 16.16	2.1281	+7 41 36.5	+13.957
JUNE 11.					JUNE 13.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 38 12.86	2.1561	-3 46 0.4	+14.832	0	0 20 23.88	2.1293	+7 55 32.4	+13.908
1	22 40 22.16	2.1539	3 31 10.1	14.843	1	0 22 31.67	2.1303	8 9 25.5	13.859
2	22 42 31.33	2.1518	3 16 19.2	14.853	2	0 24 39.52	2.1315	8 23 15.5	13.808
3	22 44 40.37	2.1496	3 1 27.7	14.863	3	0 26 47.45	2.1328	8 37 2.4	13.756
4	22 46 49.28	2.1475	2 46 35.7	14.871	4	0 28 55.45	2.1341	8 50 46.2	13.703
5	22 48 58.07	2.1455	2 31 43.2	14.877	5	0 31 3.54	2.1355	9 4 26.8	13.649
6	22 51 6.74	2.1436	2 16 50.5	14.881	6	0 33 11.71	2.1368	9 18 4.1	13.593
7	22 53 15.30	2.1418	2 1 57.5	14.885	7	0 35 19.96	2.1383	9 31 38.0	13.536
8	22 55 23.75	2.1399	1 47 4.3	14.887	8	0 37 28.31	2.1399	9 45 8.4	13.478
9	22 57 32.09	2.1383	1 32 11.1	14.887	9	0 39 36.75	2.1415	9 58 35.4	13.420
10	22 59 40.34	2.1367	1 17 17.9	14.887	10	0 41 45.29	2.1431	10 11 58.8	13.360
11	23 1 48.49	2.1351	1 2 24.7	14.885	11	0 43 53.92	2.1448	10 25 18.6	13.298
12	23 3 56.55	2.1337	0 47 31.7	14.881	12	0 46 2.66	2.1466	10 38 34.6	13.236
13	23 6 4.53	2.1323	0 32 39.0	14.877	13	0 48 11.51	2.1484	10 51 46.9	13.173
14	23 8 12.42	2.1309	0 17 46.5	14.871	14	0 50 20.47	2.1502	11 4 55.3	13.108
15	23 10 20.24	2.1297	-0 2 54.5	14.863	15	0 52 29.53	2.1521	11 17 59.8	13.042
16	23 12 27.98	2.1285	+0 11 57.0	14.854	16	0 54 38.72	2.1541	11 31 0.3	12.975
17	23 14 35.66	2.1274	0 26 48.0	14.844	17	0 56 48.02	2.1561	11 43 56.8	12.907
18	23 16 43.27	2.1264	0 41 38.3	14.833	18	0 58 57.45	2.1582	11 56 49.1	12.838
19	23 18 50.83	2.1254	0 56 28.0	14.821	19	1 1 7.00	2.1603	12 9 37.3	12.768
20	23 20 58.32	2.1245	1 11 16.8	14.806	20	1 3 16.68	2.1623	12 22 21.2	12.695
21	23 23 5.77	2.1238	1 26 4.7	14.791	21	1 5 26.48	2.1645	12 35 0.7	12.623
22	23 25 13.18	2.1231	1 40 51.7	14.775	22	1 7 36.42	2.1668	12 47 35.9	12.549
23	23 27 20.54	2.1224	1 55 37.7	14.758	23	1 9 46.49	2.1690	13 0 6.6	12.475
24	23 29 27.87	2.1219	+2 10 22.6	+14.738	24	1 11 56.70	2.1713	+13 12 32.9	+12.399

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 14.					JUNE 16.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	1 11 56.70	2.1713	+13 12 32.9	+12.399	0	2 59 14.14	2.3003	+21 20 20.6	+7.555
1	1 14 7.05	2.1737	13 24 54.5	12.322	1	3 1 32.23	2.3027	21 27 50.2	7.433
2	1 16 17.54	2.1760	13 37 11.5	12.244	2	3 3 50.46	2.3050	21 35 12.5	7.309
3	1 18 28.17	2.1784	13 49 23.8	12.164	3	3 6 8.83	2.3074	21 42 27.3	7.184
4	1 20 38.95	2.1808	14 1 31.2	12.083	4	3 8 27.35	2.3097	21 49 34.6	7.059
5	1 22 49.87	2.1833	14 13 33.8	12.003	5	3 10 45.99	2.3119	21 56 34.4	6.933
6	1 25 0.95	2.1859	14 25 31.5	11.920	6	3 13 4.78	2.3142	22 3 26.6	6.808
7	1 27 12.18	2.1884	14 37 24.2	11.837	7	3 15 23.69	2.3163	22 10 11.3	6.681
8	1 29 23.56	2.1910	14 49 11.9	11.752	8	3 17 42.73	2.3183	22 16 48.3	6.553
9	1 31 35.10	2.1936	15 0 54.4	11.666	9	3 20 1.89	2.3204	22 23 17.7	6.426
10	1 33 46.79	2.1962	15 12 31.8	11.579	10	3 22 21.18	2.3224	22 29 39.4	6.297
11	1 35 58.64	2.1988	15 24 3.9	11.491	11	3 24 40.58	2.3243	22 35 53.3	6.167
12	1 38 10.65	2.2015	15 35 30.7	11.403	12	3 27 0.10	2.3263	22 41 59.4	6.037
13	1 40 22.82	2.2043	15 46 52.2	11.313	13	3 29 19.73	2.3281	22 47 57.7	5.907
14	1 42 35.16	2.2070	15 58 8.2	11.222	14	3 31 39.47	2.3299	22 53 48.2	5.775
15	1 44 47.66	2.2097	16 9 18.8	11.130	15	3 33 59.32	2.3316	22 59 30.7	5.643
16	1 47 0.32	2.2124	16 20 23.8	11.036	16	3 36 19.26	2.3332	23 5 5.4	5.512
17	1 49 13.15	2.2153	16 31 23.1	10.943	17	3 38 39.30	2.3348	23 10 32.1	5.379
18	1 51 26.15	2.2180	16 42 16.9	10.848	18	3 40 59.44	2.3363	23 15 50.9	5.246
19	1 53 39.31	2.2208	16 53 4.8	10.751	19	3 43 19.66	2.3378	23 21 1.6	5.112
20	1 55 52.64	2.2236	17 3 47.0	10.654	20	3 45 39.97	2.3392	23 26 4.3	4.978
21	1 58 6.14	2.2263	17 14 23.3	10.556	21	3 48 0.36	2.3405	23 30 59.0	4.844
22	2 0 19.81	2.2292	17 24 53.7	10.457	22	3 50 20.83	2.3418	23 35 45.6	4.709
23	2 2 33.65	2.2320	+17 35 18.1	+10.357	23	3 52 41.37	2.3429	+23 40 24.1	+4.574
JUNE 15.					JUNE 17.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	2 4 47.65	2.2348	+17 45 36.5	+10.256	0	3 55 1.98	2.3440	+23 44 54.5	+4.438
1	2 7 1.83	2.2378	17 55 48.8	10.153	1	3 57 22.65	2.3451	23 49 16.7	4.303
2	2 9 16.18	2.2406	18 5 54.9	10.050	2	3 59 43.39	2.3461	23 53 30.8	4.167
3	2 11 30.70	2.2434	18 15 54.8	9.946	3	4 2 4.18	2.3468	23 57 36.7	4.030
4	2 13 45.39	2.2463	18 25 48.4	9.842	4	4 4 25.01	2.3477	24 1 34.4	3.893
5	2 16 0.25	2.2492	18 35 35.8	9.736	5	4 6 45.90	2.3484	24 5 23.9	3.757
6	2 18 15.29	2.2520	18 45 16.7	9.628	6	4 9 6.82	2.3490	24 9 5.2	3.619
7	2 20 30.49	2.2548	18 54 51.2	9.521	7	4 11 27.78	2.3497	24 12 38.2	3.481
8	2 22 45.86	2.2576	19 4 19.2	9.412	8	4 13 48.78	2.3502	24 16 2.9	3.343
9	2 25 1.40	2.2604	19 13 40.6	9.302	9	4 16 9.80	2.3505	24 19 19.4	3.206
10	2 27 17.11	2.2633	19 22 55.4	9.192	10	4 18 30.84	2.3508	24 22 27.6	3.068
11	2 29 32.99	2.2661	19 32 3.6	9.081	11	4 20 51.89	2.3510	24 25 27.5	2.929
12	2 31 49.04	2.2688	19 41 5.1	8.968	12	4 23 12.96	2.3512	24 28 19.1	2.791
13	2 34 5.25	2.2716	19 49 59.8	8.855	13	4 25 34.03	2.3513	24 31 2.4	2.653
14	2 36 21.63	2.2743	19 58 47.7	8.741	14	4 27 55.11	2.3513	24 33 37.4	2.513
15	2 38 38.17	2.2770	20 7 28.7	8.626	15	4 30 16.18	2.3512	24 36 4.0	2.374
16	2 40 54.87	2.2798	20 16 2.8	8.510	16	4 32 37.25	2.3510	24 38 22.3	2.236
17	2 43 11.74	2.2824	20 24 20.9	8.393	17	4 34 58.30	2.3507	24 40 32.3	2.098
18	2 45 28.76	2.2850	20 32 50.0	8.277	18	4 37 19.33	2.3503	24 42 34.0	1.959
19	2 47 45.94	2.2877	20 41 3.1	8.158	19	4 39 40.34	2.3499	24 44 27.4	1.820
20	2 50 3.28	2.2903	20 49 9.0	8.039	20	4 42 1.32	2.3493	24 46 12.4	1.681
21	2 52 20.77	2.2928	20 57 7.8	7.919	21	4 44 22.26	2.3487	24 47 49.1	1.543
22	2 54 38.41	2.2953	21 4 59.3	7.798	22	4 46 43.16	2.3480	24 49 17.6	1.405
23	2 56 56.20	2.2978	21 12 43.6	7.678	23	4 49 4.02	2.3473	24 50 37.7	1.266
24	2 59 14.14	2.3003	+21 20 20.6	+7.555	24	4 51 24.83	2.3463	+24 51 49.5	+7.322

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.
JUNE 18.							JUNE 20.						
	h	m	s	s	°	'		h	m	s	s	°	'
0	4	51	24.83	2.3463	+24	51	0	6	41	27.34	2.2114	+23	12
1	4	53	45.58	2.3453	24	52	1	6	43	39.90	2.2072	23	7
2	4	56	6.27	2.3443	24	53	2	6	45	52.20	2.2028	23	2
3	4	58	26.89	2.3432	24	54	3	6	48	4.24	2.1985	22	57
4	5	0	47.45	2.3419	24	55	4	6	50	16.02	2.1941	22	51
5	5	3	7.92	2.3405	24	55	5	6	52	27.53	2.1897	22	46
6	5	5	28.31	2.3392	24	56	6	6	54	38.78	2.1852	22	40
7	5	7	48.62	2.3377	24	56	7	6	56	49.75	2.1807	22	35
8	5	10	8.83	2.3361	24	56	8	6	59	0.46	2.1763	22	29
9	5	12	28.95	2.3344	24	56	9	7	1	10.90	2.1717	22	23
10	5	14	48.96	2.3327	24	56	10	7	3	21.06	2.1670	22	17
11	5	17	8.87	2.3308	24	55	11	7	5	30.94	2.1624	22	10
12	5	19	28.66	2.3288	24	55	12	7	7	40.55	2.1578	22	4
13	5	21	48.33	2.3268	24	54	13	7	9	49.88	2.1533	21	58
14	5	24	7.88	2.3248	24	54	14	7	11	58.94	2.1486	21	51
15	5	26	27.30	2.3226	24	53	15	7	14	7.71	2.1439	21	45
16	5	28	46.59	2.3203	24	52	16	7	16	16.21	2.1393	21	38
17	5	31	5.74	2.3180	24	51	17	7	18	24.42	2.1345	21	31
18	5	33	24.75	2.3156	24	49	18	7	20	32.35	2.1298	21	24
19	5	35	43.61	2.3131	24	48	19	7	22	40.00	2.1252	21	17
20	5	38	2.32	2.3105	24	46	20	7	24	47.37	2.1204	21	10
21	5	40	20.87	2.3078	24	45	21	7	26	54.45	2.1157	21	3
22	5	42	39.26	2.3051	24	43	22	7	29	1.25	2.1110	20	56
23	5	44	57.48	2.3023	+24	41	23	7	31	7.77	2.1063	+20	49
JUNE 19.							JUNE 21.						
0	5	47	15.54	2.2995	+24	39	0	7	33	14.00	2.1015	+20	41
1	5	49	33.42	2.2965	24	37	1	7	35	19.95	2.0968	20	34
2	5	51	51.12	2.2935	24	35	2	7	37	25.61	2.0920	20	26
3	5	54	8.64	2.2904	24	32	3	7	39	30.99	2.0873	20	18
4	5	56	25.97	2.2872	24	30	4	7	41	36.08	2.0826	20	11
5	5	58	43.10	2.2839	24	27	5	7	43	40.90	2.0778	20	3
6	6	1	0.04	2.2807	24	24	6	7	45	45.42	2.0731	19	55
7	6	3	16.78	2.2773	24	21	7	7	47	49.67	2.0684	19	47
8	6	5	33.32	2.2739	24	18	8	7	49	53.63	2.0637	19	38
9	6	7	49.65	2.2704	24	15	9	7	51	57.31	2.0590	19	30
10	6	10	5.77	2.2668	24	12	10	7	54	0.71	2.0543	19	22
11	6	12	21.67	2.2632	24	8	11	7	56	3.83	2.0496	19	14
12	6	14	37.35	2.2595	24	5	12	7	58	6.66	2.0449	19	5
13	6	16	52.81	2.2558	24	1	13	8	0	9.22	2.0403	18	57
14	6	19	8.05	2.2521	23	57	14	8	2	11.50	2.0357	18	48
15	6	21	23.06	2.2483	23	53	15	8	4	13.50	2.0311	18	39
16	6	23	37.84	2.2443	23	49	16	8	6	15.23	2.0265	18	30
17	6	25	52.38	2.2403	23	45	17	8	8	16.68	2.0220	18	22
18	6	28	6.68	2.2364	23	41	18	8	10	17.87	2.0174	18	13
19	6	30	20.75	2.2324	23	36	19	8	12	18.77	2.0128	18	4
20	6	32	34.57	2.2283	23	32	20	8	14	19.41	2.0084	17	55
21	6	34	48.14	2.2241	23	27	21	8	16	19.78	2.0040	17	45
22	6	37	1.46	2.2199	23	22	22	8	18	19.89	1.9995	17	36
23	6	39	14.53	2.2157	23	17	23	8	20	19.72	1.9951	17	27
24	6	41	27.34	2.2114	+23	12	24	8	22	19.30	1.9908	+17	17



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 22.					JUNE 24.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	8 22 19.30	1.9908	+17 17 58.8	-9.403	0	9 53 33.71	1.8293	+8 42 23.7	-11.778
1	8 24 18.61	1.9863	17 8 32.5	9.473	1	9 55 23.40	1.8272	8 30 36.1	11.809
2	8 26 17.66	1.9820	16 59 2.1	9.541	2	9 57 12.97	1.8251	8 18 46.6	11.840
3	8 28 16.45	1.9778	16 49 27.6	9.608	3	9 59 2.41	1.8231	8 6 55.3	11.869
4	8 30 14.99	1.9734	16 39 49.2	9.673	4	10 0 51.74	1.8213	7 55 2.3	11.898
5	8 32 13.26	1.9692	16 30 6.8	9.738	5	10 2 40.96	1.8193	7 43 7.5	11.928
6	8 34 11.29	1.9651	16 20 20.6	9.803	6	10 4 30.06	1.8176	7 31 11.0	11.955
7	8 36 9.07	1.9609	16 10 30.5	9.867	7	10 6 19.07	1.8159	7 19 12.9	11.983
8	8 38 6.60	1.9568	16 0 36.6	9.929	8	10 8 7.97	1.8142	7 7 13.1	12.009
9	8 40 3.88	1.9526	15 50 39.0	9.991	9	10 9 56.77	1.8126	6 55 11.8	12.034
10	8 42 0.91	1.9486	15 40 37.7	10.052	10	10 11 45.48	1.8111	6 43 9.0	12.060
11	8 43 57.71	1.9447	15 30 32.8	10.112	11	10 13 34.10	1.8096	6 31 4.6	12.085
12	8 45 54.27	1.9407	15 20 24.3	10.171	12	10 15 22.63	1.8082	6 18 58.8	12.108
13	8 47 50.59	1.9367	15 10 12.3	10.229	13	10 17 11.08	1.8068	6 6 51.6	12.132
14	8 49 46.67	1.9328	14 59 56.8	10.287	14	10 18 59.45	1.8055	5 54 43.0	12.154
15	8 51 42.52	1.9289	14 49 37.9	10.343	15	10 20 47.74	1.8043	5 42 33.1	12.176
16	8 53 38.14	1.9251	14 39 15.7	10.398	16	10 22 35.97	1.8032	5 30 21.9	12.198
17	8 55 33.53	1.9213	14 28 50.1	10.454	17	10 24 24.12	1.8020	5 18 9.4	12.218
18	8 57 28.70	1.9177	14 18 21.2	10.508	18	10 26 12.21	1.8011	5 5 55.7	12.238
19	8 59 23.65	1.9140	14 7 49.1	10.562	19	10 28 0.25	1.8001	4 53 40.8	12.258
20	9 1 18.38	1.9103	13 57 13.8	10.614	20	10 29 48.22	1.7991	4 41 24.7	12.277
21	9 3 12.89	1.9067	13 46 35.4	10.666	21	10 31 36.14	1.7983	4 29 7.6	12.295
22	9 5 7.18	1.9032	13 35 53.9	10.718	22	10 33 24.02	1.7975	4 16 49.3	12.313
23	9 7 1.27	1.8998	+13 25 9.3	-10.767	23	10 35 11.84	1.7968	+4 4 30.0	-12.329
JUNE 23.					JUNE 25.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 8 55.15	1.8963	+13 14 21.9	-10.815	0	10 36 59.63	1.7962	+3 52 9.8	-12.345
1	9 10 48.82	1.8928	13 3 31.5	10.865	1	10 38 47.38	1.7956	3 39 48.6	12.362
2	9 12 42.29	1.8895	12 52 38.1	10.913	2	10 40 35.10	1.7951	3 27 26.4	12.377
3	9 14 35.56	1.8863	12 41 41.9	10.959	3	10 42 22.79	1.7947	3 15 3.4	12.391
4	9 16 28.64	1.8830	12 30 43.0	11.006	4	10 44 10.46	1.7943	3 2 39.5	12.406
5	9 18 21.52	1.8798	12 19 41.2	11.052	5	10 45 58.11	1.7940	2 50 14.7	12.419
6	9 20 14.21	1.8766	12 8 36.8	11.097	6	10 47 45.74	1.7937	2 37 49.2	12.431
7	9 22 6.71	1.8735	11 57 29.6	11.141	7	10 49 33.35	1.7935	2 25 23.0	12.443
8	9 23 59.03	1.8705	11 46 19.9	11.183	8	10 51 20.96	1.7934	2 12 56.0	12.455
9	9 25 51.17	1.8675	11 35 7.6	11.226	9	10 53 8.56	1.7934	2 0 28.4	12.466
10	9 27 43.13	1.8645	11 23 52.8	11.268	10	10 54 56.17	1.7934	1 48 0.1	12.476
11	9 29 34.91	1.8616	11 12 35.5	11.309	11	10 56 43.77	1.7935	1 35 31.3	12.486
12	9 31 26.52	1.8588	11 1 15.7	11.350	12	10 58 31.39	1.7938	1 23 1.8	12.495
13	9 33 17.97	1.8561	10 49 53.5	11.389	13	11 0 19.02	1.7939	1 10 31.9	12.503
14	9 35 9.25	1.8533	10 38 29.0	11.428	14	11 2 6.66	1.7942	0 58 1.5	12.511
15	9 37 0.36	1.8506	10 27 2.2	11.466	15	11 3 54.32	1.7945	0 45 30.6	12.518
16	9 38 51.32	1.8481	10 15 33.1	11.503	16	11 5 42.00	1.7950	0 32 59.4	12.524
17	9 40 42.13	1.8455	10 4 1.8	11.540	17	11 7 29.72	1.7955	0 20 27.7	12.530
18	9 42 32.78	1.8430	9 52 28.3	11.577	18	11 9 17.46	1.7961	+0 7 55.8	12.535
19	9 44 23.29	1.8406	9 40 52.6	11.613	19	11 11 5.25	1.7968	-0 4 36.5	12.540
20	9 46 13.65	1.8382	9 29 14.8	11.647	20	11 12 53.07	1.7974	0 17 9.0	12.543
21	9 48 3.87	1.8358	9 17 35.0	11.680	21	11 14 40.94	1.7982	0 29 41.7	12.547
22	9 49 53.95	1.8335	9 5 53.2	11.713	22	11 16 28.85	1.7991	0 42 14.6	12.550
23	9 51 43.89	1.8313	8 54 9.4	11.746	23	11 18 16.83	1.8000	0 54 47.7	12.552
24	9 53 33.71	1.8293	+ 8 42 23.7	-11.778	24	11 20 4.85	1.8009	-1 7 20.8	-12.555

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 26.					JUNE 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 20 4.85	1.8009	- 1 7 20.8	-12.553	0	12 49 0.97	1.9323	-10 58 53.2	-11.813
1	11 21 52.94	1.8020	1 19 54.0	12.554	1	12 50 57.04	1.9368	11 10 40.9	11.778
2	11 23 41.09	1.8032	1 32 27.3	12.554	2	12 52 53.38	1.9413	11 22 26.5	11.743
3	11 25 29.32	1.8043	1 45 0.5	12.553	3	12 54 49.99	1.9458	11 34 10.0	11.706
4	11 27 17.61	1.8056	1 57 33.7	12.553	4	12 56 46.88	1.9506	11 45 51.2	11.668
5	11 29 5.99	1.8070	2 10 6.9	12.552	5	12 58 44.06	1.9554	11 57 30.2	11.630
6	11 30 54.45	1.8083	2 22 39.9	12.549	6	13 0 41.53	1.9602	12 9 6.8	11.590
7	11 32 42.99	1.8098	2 35 12.8	12.547	7	13 2 39.28	1.9650	12 20 41.0	11.550
8	11 34 31.63	1.8114	2 47 45.5	12.543	8	13 4 37.33	1.9700	12 32 12.8	11.509
9	11 36 20.36	1.8129	3 0 17.9	12.538	9	13 6 35.68	1.9751	12 43 42.1	11.467
10	11 38 9.18	1.8147	3 12 50.1	12.534	10	13 8 34.34	1.9802	12 55 8.8	11.423
11	11 39 58.12	1.8165	3 25 22.0	12.528	11	13 10 33.30	1.9853	13 6 32.9	11.378
12	11 41 47.16	1.8183	3 37 53.5	12.522	12	13 12 32.58	1.9906	13 17 54.2	11.333
13	11 43 36.31	1.8203	3 50 24.6	12.515	13	13 14 32.17	1.9958	13 29 12.8	11.288
14	11 45 25.59	1.8223	4 2 55.3	12.508	14	13 16 32.08	2.0013	13 40 28.7	11.240
15	11 47 14.98	1.8242	4 15 25.5	12.499	15	13 18 32.32	2.0067	13 51 41.6	11.192
16	11 49 4.49	1.8263	4 27 55.2	12.490	16	13 20 32.88	2.0121	14 2 51.7	11.143
17	11 50 54.14	1.8286	4 40 24.3	12.480	17	13 22 33.77	2.0177	14 13 58.7	11.092
18	11 52 43.92	1.8308	4 52 52.8	12.470	18	13 24 35.00	2.0233	14 25 2.7	11.040
19	11 54 33.84	1.8332	5 5 20.7	12.459	19	13 26 36.57	2.0289	14 36 3.5	10.988
20	11 56 23.90	1.8355	5 17 47.9	12.448	20	13 28 38.47	2.0347	14 47 1.2	10.934
21	11 58 14.10	1.8380	5 30 14.4	12.435	21	13 30 40.73	2.0405	14 57 55.6	10.879
22	12 0 4.46	1.8407	5 42 40.1	12.422	22	13 32 43.33	2.0463	15 8 46.7	10.823
23	12 1 54.98	1.8433	- 5 55 5.0	-12.408	23	13 34 46.29	2.0523	-15 19 34.4	-10.767
JUNE 27.					JUNE 29.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	12 3 45.65	1.8459	- 6 7 29.0	-12.393	0	13 36 49.60	2.0582	-15 30 18.7	-10.708
1	12 5 36.49	1.8487	6 19 52.2	12.378	1	13 38 53.27	2.0642	15 40 59.4	10.648
2	12 7 27.49	1.8515	6 32 14.4	12.363	2	13 40 57.30	2.0703	15 51 36.5	10.588
3	12 9 18.67	1.8545	6 44 35.7	12.346	3	13 43 1.70	2.0764	16 2 10.0	10.527
4	12 11 10.03	1.8574	6 56 55.9	12.328	4	13 45 6.47	2.0827	16 12 39.7	10.463
5	12 13 1.56	1.8606	7 9 15.1	12.310	5	13 47 11.62	2.0889	16 23 5.6	10.400
6	12 14 53.29	1.8637	7 21 33.1	12.291	6	13 49 17.14	2.0952	16 33 27.7	10.335
7	12 16 45.20	1.8668	7 33 50.0	12.272	7	13 51 23.04	2.1015	16 43 45.8	10.268
8	12 18 37.31	1.8702	7 46 5.7	12.252	8	13 53 29.32	2.1078	16 53 59.8	10.200
9	12 20 29.61	1.8735	7 58 20.2	12.230	9	13 55 35.98	2.1143	17 4 9.8	10.133
10	12 22 22.12	1.8769	8 10 33.3	12.208	10	13 57 43.04	2.1208	17 14 15.7	10.062
11	12 24 14.84	1.8804	8 22 45.1	12.184	11	13 59 50.48	2.1273	17 24 17.2	9.990
12	12 26 7.77	1.8840	8 34 55.4	12.160	12	14 1 58.32	2.1339	17 34 14.5	9.918
13	12 28 0.92	1.8876	8 47 4.3	12.137	13	14 4 6.55	2.1405	17 44 7.4	9.844
14	12 29 54.28	1.8913	8 59 11.8	12.112	14	14 6 15.18	2.1473	17 53 55.8	9.768
15	12 31 47.87	1.8951	9 11 17.7	12.085	15	14 8 24.22	2.1539	18 3 39.6	9.692
16	12 33 41.69	1.8989	9 23 22.0	12.058	16	14 10 33.65	2.1607	18 13 18.8	9.614
17	12 35 35.74	1.9028	9 35 24.7	12.030	17	14 12 43.50	2.1675	18 22 53.3	9.536
18	12 37 30.03	1.9068	9 47 25.6	12.002	18	14 14 53.75	2.1743	18 32 23.1	9.455
19	12 39 24.56	1.9108	9 59 24.9	11.973	19	14 17 4.41	2.1811	18 41 47.9	9.373
20	12 41 19.33	1.9149	10 11 22.3	11.942	20	14 19 15.48	2.1879	18 51 7.9	9.291
21	12 43 14.35	1.9192	10 23 17.9	11.912	21	14 21 26.96	2.1949	19 0 22.8	9.206
22	12 45 9.63	1.9235	10 35 11.7	11.879	22	14 23 38.87	2.2019	19 9 32.6	9.120
23	12 47 5.17	1.9278	10 47 3.4	11.846	23	14 25 51.19	2.2088	19 18 37.2	9.033
24	12 49 0.97	1.9323	-10 58 53.2	-11.813	24	14 28 3.92	2.2158	-19 27 36.6	-8.945

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JUNE 30.					JULY 2.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 28 3.92	2.2158	-19 27 36.6	-8.945	0	16 22 26.28	2.5364	-24 28 17.2	-3.048
1	14 30 17.08	2.2228	19 36 30.6	8.855	1	16 24 58.63	2.5417	24 31 15.4	2.893
2	14 32 30.66	2.2298	19 45 19.2	8.764	2	16 27 31.28	2.5468	24 34 4.3	2.736
3	14 34 44.66	2.2369	19 54 2.3	8.672	3	16 30 4.25	2.5519	24 36 43.7	2.578
4	14 36 59.09	2.2440	20 2 39.8	8.578	4	16 32 37.51	2.5568	24 39 13.7	2.420
5	14 39 13.94	2.2511	20 11 11.6	8.483	5	16 35 11.07	2.5617	24 41 34.1	2.259
6	14 41 29.22	2.2583	20 19 37.7	8.386	6	16 37 44.91	2.5663	24 43 44.8	2.098
7	14 43 44.93	2.2654	20 27 57.9	8.288	7	16 40 19.03	2.5709	24 45 45.9	1.938
8	14 46 1.07	2.2725	20 36 12.2	8.188	8	16 42 53.42	2.5754	24 47 37.3	1.775
9	14 48 17.63	2.2796	20 44 20.4	8.087	9	16 45 28.08	2.5798	24 49 18.9	1.612
10	14 50 34.62	2.2868	20 52 22.6	7.984	10	16 48 2.99	2.5840	24 50 50.7	1.448
11	14 52 52.04	2.2939	21 0 18.5	7.880	11	16 50 38.16	2.5881	24 52 12.6	1.282
12	14 55 9.89	2.3011	21 8 8.2	7.775	12	16 53 13.56	2.5920	24 53 24.5	1.115
13	14 57 28.17	2.3083	21 15 51.5	7.668	13	16 55 49.20	2.5959	24 54 26.4	0.948
14	14 59 46.88	2.3153	21 23 28.4	7.561	14	16 58 25.07	2.5996	24 55 18.3	0.781
15	15 2 6.01	2.3225	21 30 58.8	7.451	15	17 1 1.15	2.6031	24 56 0.1	0.613
16	15 4 25.58	2.3297	21 38 22.5	7.339	16	17 3 37.44	2.6066	24 56 31.8	0.443
17	15 6 45.57	2.3368	21 45 39.5	7.227	17	17 6 13.94	2.6098	24 56 53.3	0.273
18	15 9 5.99	2.3438	21 52 49.7	7.113	18	17 8 50.62	2.6129	24 57 4.6	-0.103
19	15 11 26.83	2.3509	21 59 53.1	6.998	19	17 11 27.49	2.6160	24 57 5.6	+0.068
20	15 13 48.10	2.3580	22 6 49.4	6.881	20	17 14 4.54	2.6188	24 56 56.4	0.240
21	15 16 9.79	2.3650	22 13 38.8	6.763	21	17 16 41.75	2.6216	24 56 36.8	0.413
22	15 18 31.90	2.3721	22 20 20.9	6.643	22	17 19 19.13	2.6242	24 56 6.9	0.585
23	15 20 54.44	2.3790	-22 26 55.9	-6.523	23	17 21 56.65	2.6265	-24 55 26.6	+0.758
JULY 1.					JULY 3.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 23 17.38	2.3859	-22 33 23.6	-6.400	0	17 24 34.31	2.6288	-24 54 35.9	+0.932
1	15 25 40.75	2.3930	22 39 43.9	6.276	1	17 27 12.11	2.6309	24 53 34.8	1.106
2	15 28 4.54	2.3998	22 45 56.7	6.150	2	17 29 50.02	2.6328	24 52 23.2	1.280
3	15 30 28.73	2.4067	22 52 1.9	6.023	3	17 32 28.05	2.6348	24 51 1.2	1.454
4	15 32 53.34	2.4135	22 57 59.4	5.894	4	17 35 6.19	2.6364	24 49 28.7	1.629
5	15 35 18.35	2.4203	23 3 49.2	5.765	5	17 37 44.42	2.6379	24 47 45.7	1.805
6	15 37 43.77	2.4270	23 9 31.2	5.634	6	17 40 22.74	2.6393	24 45 52.1	1.980
7	15 40 9.59	2.4337	23 15 5.3	5.502	7	17 43 1.13	2.6405	24 43 48.1	2.155
8	15 42 35.81	2.4403	23 20 31.4	5.368	8	17 45 39.60	2.6416	24 41 33.5	2.331
9	15 45 2.42	2.4468	23 25 49.4	5.233	9	17 48 18.12	2.6424	24 39 8.4	2.507
10	15 47 29.43	2.4533	23 30 59.3	5.096	10	17 50 56.69	2.6433	24 36 32.7	2.683
11	15 49 56.82	2.4598	23 36 0.9	4.958	11	17 53 35.31	2.6439	24 33 46.5	2.858
12	15 52 24.00	2.4662	23 40 54.3	4.819	12	17 56 13.96	2.6443	24 30 49.7	3.034
13	15 54 52.76	2.4725	23 45 39.2	4.678	13	17 58 52.63	2.6446	24 27 42.4	3.209
14	15 57 21.30	2.4787	23 50 15.7	4.537	14	18 1 31.31	2.6448	24 24 24.6	3.385
15	15 59 50.20	2.4848	23 54 43.6	4.393	15	18 4 10.00	2.6448	24 20 56.2	3.560
16	16 2 19.48	2.4910	23 59 2.9	4.248	16	18 6 48.68	2.6446	24 17 17.4	3.735
17	16 4 49.12	2.4969	24 3 13.4	4.103	17	18 9 27.35	2.6443	24 13 28.0	3.910
18	16 7 19.11	2.5028	24 7 15.2	3.956	18	18 12 6.00	2.6438	24 9 28.2	4.084
19	16 9 49.46	2.5087	24 11 8.1	3.808	19	18 14 44.61	2.6433	24 5 17.9	4.258
20	16 12 20.15	2.5144	24 14 52.1	3.658	20	18 17 23.19	2.6425	24 0 57.2	4.433
21	16 14 51.19	2.5201	24 18 27.1	3.508	21	18 20 1.71	2.6416	23 56 26.0	4.606
22	16 17 22.56	2.5256	24 21 53.0	3.355	22	18 22 40.18	2.6406	23 51 44.5	4.779
23	16 19 54.26	2.5310	24 25 9.7	3.202	23	18 25 18.58	2.6394	23 46 52.5	4.952
24	16 22 26.28	2.5364	-24 28 17.2	-3.048	24	18 27 56.91	2.6381	-23 41 50.3	+5.123



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 4.					JULY 6.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 27 56.91	2.6381	-23 41 50.3	+ 5.123	0	20 30 55.76	2.4559	-16 36 34.0	+12.078
1	18 30 35.15	2.6367	23 36 37.8	5.294	1	20 33 22.96	2.4508	16 24 26.1	12.186
2	18 33 13.31	2.6351	23 31 15.0	5.466	2	20 35 49.85	2.4456	16 12 11.7	12.292
3	18 35 51.36	2.6333	23 25 41.9	5.636	3	20 38 16.43	2.4406	15 59 51.1	12.396
4	18 38 29.30	2.6314	23 19 58.7	5.804	4	20 40 42.71	2.4353	15 47 24.3	12.497
5	18 41 7.13	2.6295	23 14 5.4	5.973	5	20 43 8.67	2.4302	15 34 51.5	12.597
6	18 43 44.84	2.6273	23 8 1.9	6.142	6	20 45 34.33	2.4251	15 22 12.7	12.696
7	18 46 22.41	2.6251	23 1 48.4	6.308	7	20 47 59.68	2.4199	15 9 28.1	12.792
8	18 48 59.85	2.6228	22 55 24.9	6.474	8	20 50 24.72	2.4148	14 56 37.7	12.886
9	18 51 37.14	2.6202	22 48 51.5	6.639	9	20 52 49.46	2.4097	14 43 41.8	12.978
10	18 54 14.27	2.6176	22 42 8.2	6.804	10	20 55 13.88	2.4047	14 30 40.3	13.069
11	18 56 51.25	2.6149	22 35 15.0	6.968	11	20 57 38.00	2.3996	14 17 33.5	13.158
12	18 59 28.06	2.6120	22 28 12.1	7.130	12	21 0 1.82	2.3944	14 4 21.4	13.245
13	19 2 4.69	2.6091	22 20 59.4	7.292	13	21 2 25.33	2.3893	13 51 4.1	13.330
14	19 4 41.15	2.6060	22 13 37.1	7.452	14	21 4 48.54	2.3843	13 37 41.8	13.413
15	19 7 17.41	2.6028	22 6 5.2	7.611	15	21 7 11.45	2.3793	13 24 14.6	13.494
16	19 9 53.48	2.5996	21 58 23.8	7.769	16	21 9 34.06	2.3743	13 10 42.5	13.574
17	19 12 29.35	2.5961	21 50 32.9	7.927	17	21 11 56.37	2.3693	12 57 5.7	13.651
18	19 15 5.01	2.5926	21 42 32.6	8.083	18	21 14 18.38	2.3644	12 43 24.4	13.727
19	19 17 40.46	2.5890	21 34 23.0	8.238	19	21 16 40.10	2.3596	12 29 38.5	13.802
20	19 20 15.69	2.5853	21 26 4.1	8.391	20	21 19 1.53	2.3548	12 15 48.2	13.873
21	19 22 50.70	2.5815	21 17 36.1	8.543	21	21 21 22.67	2.3498	12 1 53.7	13.943
22	19 25 25.47	2.5777	21 8 59.0	8.693	22	21 23 43.51	2.3450	11 47 55.0	14.012
23	19 28 0.02	2.5738	-21 0 12.9	+ 8.843	23	21 26 4.07	2.3403	-11 33 52.3	+14.078
JULY 5.					JULY 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 30 34.32	2.5697	-20 51 17.8	+ 8.992	0	21 28 24.35	2.3357	-11 19 45.6	+14.143
1	19 33 8.38	2.5656	20 42 13.9	9.138	1	21 30 44.35	2.3309	11 5 35.1	14.206
2	19 35 42.19	2.5613	20 33 1.3	9.283	2	21 33 4.06	2.3263	10 51 21.0	14.266
3	19 38 15.74	2.5571	20 23 39.9	9.428	3	21 35 23.50	2.3218	10 37 3.2	14.326
4	19 40 49.04	2.5528	20 14 10.0	9.569	4	21 37 42.67	2.3173	10 22 41.9	14.383
5	19 43 22.08	2.5484	20 4 31.6	9.710	5	21 40 1.57	2.3128	10 8 17.3	14.438
6	19 45 54.85	2.5439	19 54 44.8	9.849	6	21 42 20.20	2.3083	9 53 49.4	14.492
7	19 48 27.35	2.5394	19 44 49.7	9.988	7	21 44 38.56	2.3038	9 39 18.3	14.543
8	19 50 59.58	2.5348	19 34 46.3	10.124	8	21 46 56.66	2.2995	9 24 44.2	14.593
9	19 53 31.53	2.5302	19 24 34.8	10.258	9	21 49 14.50	2.2953	9 10 7.1	14.641
10	19 56 3.20	2.5254	19 14 15.3	10.392	10	21 51 32.09	2.2910	8 55 27.3	14.687
11	19 58 34.58	2.5207	19 3 47.8	10.523	11	21 53 49.42	2.2868	8 40 44.7	14.733
12	20 1 5.68	2.5159	18 53 12.6	10.652	12	21 56 6.50	2.2827	8 25 59.4	14.775
13	20 3 36.49	2.5111	18 42 29.6	10.781	13	21 58 23.34	2.2787	8 11 11.7	14.815
14	20 6 7.01	2.5062	18 31 38.9	10.908	14	22 0 39.94	2.2747	7 56 21.6	14.854
15	20 8 37.23	2.5013	18 20 40.7	11.033	15	22 2 56.30	2.2707	7 41 29.2	14.892
16	20 11 7.16	2.4964	18 9 35.0	11.156	16	22 5 12.42	2.2668	7 26 34.6	14.928
17	20 13 36.80	2.4914	17 58 22.0	11.278	17	22 7 28.31	2.2629	7 11 37.9	14.961
18	20 16 6.13	2.4863	17 47 1.7	11.398	18	22 9 43.97	2.2592	6 56 39.3	14.993
19	20 18 35.16	2.4813	17 35 34.3	11.515	19	22 11 59.41	2.2555	6 41 38.8	15.023
20	20 21 3.89	2.4763	17 23 59.9	11.631	20	22 14 14.63	2.2518	6 26 36.5	15.052
21	20 23 32.31	2.4713	17 12 18.6	11.746	21	22 16 29.63	2.2483	6 11 32.6	15.078
22	20 26 0.44	2.4662	17 0 30.4	11.859	22	22 18 44.42	2.2447	5 56 27.1	15.104
23	20 28 28.25	2.4610	16 48 35.5	11.970	23	22 20 58.99	2.2412	5 41 20.1	15.128
24	20 30 55.76	2.4559	-16 36 34.0	+12.078	24	22 23 13.36	2.2378	- 5 26 11.8	+15.149

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 8.					JULY 10.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	22 23 13.36	2.2378	-5 26 11.8	+15.149	0	0 8 4.71	2.1584	+ 6 36 12.5	+14.394
1	22 25 27.53	2.2346	5 11 2.2	15.169	1	0 10 14.22	2.1584	6 50 34.7	14.344
2	22 27 41.51	2.2313	4 55 51.5	15.188	2	0 12 23.72	2.1585	7 4 53.8	14.293
3	22 29 55.29	2.2281	4 40 39.7	15.204	3	0 14 33.24	2.1588	7 19 9.9	14.243
4	22 32 8.88	2.2250	4 25 27.0	15.220	4	0 16 42.77	2.1589	7 33 22.9	14.189
5	22 34 22.29	2.2220	4 10 13.3	15.233	5	0 18 52.31	2.1593	7 47 32.6	14.135
6	22 36 35.52	2.2191	3 54 59.0	15.244	6	0 21 1.88	2.1597	8 1 39.1	14.080
7	22 38 48.58	2.2162	3 39 44.0	15.255	7	0 23 11.47	2.1600	8 15 42.2	14.023
8	22 41 1.46	2.2133	3 24 28.4	15.264	8	0 25 21.08	2.1605	8 29 41.8	13.965
9	22 43 14.17	2.2105	3 9 12.3	15.271	9	0 27 30.73	2.1610	8 43 38.0	13.907
10	22 45 26.72	2.2078	2 53 55.9	15.276	10	0 29 40.40	2.1616	8 57 30.6	13.847
11	22 47 39.11	2.2052	2 38 39.2	15.279	11	0 31 50.12	2.1623	9 11 19.6	13.785
12	22 49 51.34	2.2027	2 23 22.4	15.281	12	0 33 59.87	2.1629	9 25 4.9	13.723
13	22 52 3.43	2.2002	2 8 5.5	15.283	13	0 36 9.67	2.1638	9 38 46.4	13.659
14	22 54 15.36	2.1978	1 52 48.5	15.282	14	0 38 19.52	2.1646	9 52 24.0	13.595
15	22 56 27.16	2.1955	1 37 31.7	15.279	15	0 40 29.42	2.1655	10 5 57.8	13.530
16	22 58 38.82	2.1932	1 22 15.0	15.275	16	0 42 39.38	2.1664	10 19 27.6	13.463
17	23 0 50.34	2.1909	1 6 58.7	15.269	17	0 44 49.39	2.1673	10 32 53.3	13.394
18	23 3 1.73	2.1888	0 51 42.7	15.263	18	0 46 59.46	2.1684	10 46 14.9	13.326
19	23 5 13.00	2.1868	0 36 27.2	15.254	19	0 49 9.60	2.1695	10 59 32.4	13.256
20	23 7 24.15	2.1848	0 21 12.2	15.244	20	0 51 19.80	2.1706	11 12 45.6	13.183
21	23 9 35.18	2.1829	-0 5 57.9	15.232	21	0 53 30.07	2.1718	11 25 54.4	13.112
22	23 11 46.10	2.1811	+0 9 15.6	15.219	22	0 55 40.42	2.1731	11 38 59.0	13.039
23	23 13 56.91	2.1793	+0 24 28.4	+15.205	23	0 57 50.84	2.1743	+11 51 59.1	+12.963
JULY 9.					JULY 11.				
	h m s	s	" "	" "		h m s	s	" "	" "
0	23 16 7.61	2.1776	+0 39 40.2	+15.188	0	1 0 1.33	2.1756	+12 4 54.6	+12.888
1	23 18 18.22	2.1761	0 54 51.0	15.172	1	1 2 11.91	2.1770	12 17 45.6	12.812
2	23 20 28.74	2.1745	1 10 0.8	15.153	2	1 4 22.57	2.1785	12 30 32.0	12.734
3	23 22 39.16	2.1730	1 25 9.3	15.132	3	1 6 33.33	2.1800	12 43 13.7	12.655
4	23 24 49.50	2.1716	1 40 16.6	15.111	4	1 8 44.17	2.1814	12 55 50.6	12.575
5	23 26 59.75	2.1703	1 55 22.6	15.088	5	1 10 55.10	2.1829	13 8 22.7	12.495
6	23 29 9.93	2.1691	2 10 27.1	15.063	6	1 13 6.12	2.1845	13 20 50.7	12.413
7	23 31 20.04	2.1678	2 25 30.2	15.038	7	1 15 17.24	2.1863	13 33 12.2	12.329
8	23 33 30.07	2.1668	2 40 31.6	15.010	8	1 17 28.47	2.1879	13 45 29.5	12.247
9	23 35 40.05	2.1658	2 55 31.4	14.982	9	1 19 39.79	2.1895	13 57 41.8	12.162
10	23 37 49.96	2.1647	3 10 29.4	14.952	10	1 21 51.21	2.1913	14 9 48.9	12.076
11	23 39 59.81	2.1638	3 25 25.6	14.920	11	1 24 2.74	2.1930	14 21 50.9	11.989
12	23 42 9.61	2.1630	3 40 19.8	14.888	12	1 26 14.37	2.1948	14 33 47.6	11.901
13	23 44 19.37	2.1623	3 55 12.1	14.853	13	1 28 26.11	2.1967	14 45 39.0	11.813
14	23 46 29.08	2.1615	4 10 2.2	14.818	14	1 30 37.97	2.1986	14 57 25.1	11.723
15	23 48 38.75	2.1609	4 24 50.2	14.782	15	1 32 49.94	2.2004	15 9 5.7	11.632
16	23 50 48.39	2.1604	4 39 36.0	14.744	16	1 35 2.02	2.2023	15 20 40.9	11.541
17	23 52 58.00	2.1599	4 54 19.5	14.705	17	1 37 14.22	2.2043	15 32 10.6	11.448
18	23 55 7.58	2.1594	5 9 0.6	14.664	18	1 39 26.54	2.2063	15 43 34.7	11.354
19	23 57 17.13	2.1591	5 23 39.2	14.622	19	1 41 38.98	2.2083	15 54 53.1	11.259
20	23 59 26.67	2.1588	5 38 15.2	14.579	20	1 43 51.53	2.2103	16 6 5.8	11.164
21	0 1 36.19	2.1587	5 52 48.7	14.535	21	1 46 4.21	2.2124	16 17 12.8	11.068
22	0 3 45.71	2.1585	6 7 19.4	14.489	22	1 48 17.02	2.2144	16 28 14.0	10.971
23	0 5 55.21	2.1583	6 21 47.4	14.443	23	1 50 29.94	2.2164	16 39 9.3	10.872
24	0 8 4.71	2.1584	+6 36 12.5	+14.394	24	1 52 42.99	2.2186	+16 49 58.6	+10.773

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 12.					JULY 14.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	1 52 42.99	2.2186	+16 49 58.6	+10.773	0	3 41 36.97	2.3113	+23 18 5.7	+5.143
1	1 54 56.17	2.2208	17 0 42.0	10.673	1	3 43 55.68	2.3124	23 23 10.4	5.012
2	1 57 9.48	2.2228	17 11 19.4	10.573	2	3 46 14.46	2.3135	23 28 7.1	4.880
3	1 59 22.91	2.2250	17 21 50.8	10.472	3	3 48 33.30	2.3146	23 32 56.0	4.748
4	2 1 36.48	2.2272	17 32 16.0	10.368	4	3 50 52.21	2.3156	23 37 36.9	4.616
5	2 3 50.17	2.2293	17 42 35.0	10.265	5	3 53 11.17	2.3164	23 42 9.9	4.484
6	2 6 4.00	2.2315	17 52 47.8	10.161	6	3 55 30.18	2.3173	23 46 35.0	4.351
7	2 8 17.95	2.2337	18 2 54.3	10.056	7	3 57 49.24	2.3181	23 50 52.0	4.218
8	2 10 32.04	2.2359	18 12 54.5	9.951	8	4 0 8.35	2.3188	23 55 1.1	4.085
9	2 12 46.26	2.2381	18 22 48.4	9.844	9	4 2 27.50	2.3194	23 59 2.2	3.951
10	2 15 0.61	2.2403	18 32 35.8	9.736	10	4 4 46.68	2.3201	24 2 55.2	3.817
11	2 17 15.09	2.2425	18 42 16.7	9.627	11	4 7 5.91	2.3207	24 6 40.2	3.683
12	2 19 29.71	2.2448	18 51 51.0	9.518	12	4 9 25.16	2.3211	24 10 17.2	3.549
13	2 21 44.46	2.2469	19 1 18.8	9.408	13	4 11 44.44	2.3215	24 13 46.1	3.415
14	2 23 59.34	2.2492	19 10 40.0	9.298	14	4 14 3.74	2.3218	24 17 7.0	3.280
15	2 26 14.36	2.2513	19 19 54.6	9.187	15	4 16 23.05	2.3221	24 20 19.7	3.145
16	2 28 29.50	2.2535	19 29 2.4	9.074	16	4 18 42.39	2.3223	24 23 24.4	3.011
17	2 30 44.78	2.2558	19 38 3.5	8.962	17	4 21 1.73	2.3223	24 26 21.0	2.876
18	2 33 0.19	2.2578	19 46 57.8	8.848	18	4 23 21.07	2.3224	24 29 9.5	2.741
19	2 35 15.72	2.2600	19 55 45.2	8.733	19	4 25 40.42	2.3225	24 31 49.9	2.606
20	2 37 31.39	2.2623	20 4 25.7	8.618	20	4 27 59.77	2.3223	24 34 22.2	2.471
21	2 39 47.19	2.2643	20 12 59.3	8.503	21	4 30 19.10	2.3222	24 36 46.4	2.336
22	2 42 3.11	2.2664	20 21 26.0	8.386	22	4 32 38.43	2.3220	24 39 2.5	2.201
23	2 44 19.16	2.2686	+20 29 45.6	+8.268	23	4 34 57.74	2.3217	+24 41 10.5	+2.065
JULY 13.					JULY 15.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	2 46 35.34	2.2707	+20 37 58.1	+8.149	0	4 37 17.03	2.3213	+24 43 10.3	+1.929
1	2 48 51.64	2.2728	20 46 3.5	8.031	1	4 39 36.29	2.3208	24 45 2.0	1.794
2	2 51 8.07	2.2748	20 54 1.8	7.913	2	4 41 55.53	2.3203	24 46 45.6	1.660
3	2 53 24.62	2.2768	21 1 53.0	7.793	3	4 44 14.73	2.3197	24 48 21.2	1.525
4	2 55 41.28	2.2788	21 9 36.9	7.671	4	4 46 33.89	2.3190	24 49 48.6	1.389
5	2 57 58.07	2.2808	21 17 13.5	7.549	5	4 48 53.01	2.3183	24 51 7.9	1.254
6	3 0 14.97	2.2827	21 24 42.8	7.428	6	4 51 12.08	2.3174	24 52 19.1	1.119
7	3 2 31.99	2.2847	21 32 4.9	7.306	7	4 53 31.10	2.3165	24 53 22.2	0.984
8	3 4 49.13	2.2865	21 39 19.5	7.183	8	4 55 50.06	2.3155	24 54 17.2	0.850
9	3 7 6.37	2.2883	21 46 26.8	7.059	9	4 58 8.96	2.3144	24 55 4.2	0.716
10	3 9 23.73	2.2902	21 53 26.6	6.934	10	5 0 27.79	2.3133	24 55 43.1	0.582
11	3 11 41.19	2.2919	22 0 18.9	6.810	11	5 2 46.56	2.3121	24 56 14.0	0.447
12	3 13 58.76	2.2938	22 7 3.8	6.685	12	5 5 5.24	2.3108	24 56 36.7	0.313
13	3 16 16.44	2.2954	22 13 41.1	6.559	13	5 7 23.85	2.3095	24 56 51.5	0.179
14	3 18 34.21	2.2971	22 20 10.9	6.433	14	5 9 42.38	2.3081	24 56 58.2	+0.046
15	3 20 52.09	2.2988	22 26 33.0	6.306	15	5 12 0.82	2.3065	24 56 57.0	-0.087
16	3 23 10.06	2.3003	22 32 47.6	6.178	16	5 14 19.16	2.3049	24 56 47.8	0.220
17	3 25 28.12	2.3018	22 38 54.4	6.050	17	5 16 37.41	2.3033	24 56 30.6	0.353
18	3 27 46.28	2.3033	22 44 53.0	5.923	18	5 18 55.56	2.3016	24 56 5.5	0.485
19	3 30 4.52	2.3048	22 50 45.1	5.793	19	5 21 13.60	2.2997	24 55 32.4	0.617
20	3 32 22.86	2.3063	22 56 28.8	5.664	20	5 23 31.52	2.2978	24 54 51.5	0.748
21	3 34 41.27	2.3075	23 2 4.8	5.534	21	5 25 49.34	2.2959	24 54 2.6	0.880
22	3 36 59.76	2.3088	23 7 32.9	5.404	22	5 28 7.03	2.2938	24 53 5.9	1.011
23	3 39 18.33	2.3101	23 12 53.3	5.273	23	5 30 24.60	2.2918	24 52 1.3	1.142
24	3 41 36.97	2.3113	+23 18 5.7	+5.143	24	5 32 42.04	2.2896	+24 50 48.9	-1.272

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 16.					JULY 18.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	5 32 42.04	2.2806	+24 50 48.9	-1.272	0	7 18 58.42	2.1212	+21 30 32.0	-6.807
1	5 34 59.35	2.2873	24 49 28.7	1.401	1	7 21 5.56	2.1168	21 23 40.7	6.908
2	5 37 16.52	2.2851	24 48 0.8	1.530	2	7 23 12.44	2.1124	21 16 43.6	6.999
3	5 39 33.56	2.2828	24 46 25.1	1.659	3	7 25 19.05	2.1080	21 9 40.8	7.098
4	5 41 50.45	2.2802	24 44 41.7	1.788	4	7 27 25.40	2.1037	21 2 32.4	7.188
5	5 44 7.18	2.2777	24 42 50.6	1.916	5	7 29 31.49	2.0993	20 55 18.3	7.281
6	5 46 23.77	2.2752	24 40 51.8	2.043	6	7 31 37.32	2.0950	20 47 58.7	7.378
7	5 48 40.20	2.2725	24 38 45.4	2.170	7	7 33 42.89	2.0906	20 40 33.5	7.465
8	5 50 56.47	2.2698	24 36 31.4	2.297	8	7 35 48.19	2.0861	20 33 2.9	7.555
9	5 53 12.57	2.2670	24 34 9.8	2.423	9	7 37 53.22	2.0818	20 25 26.9	7.644
10	5 55 28.51	2.2642	24 31 40.7	2.548	10	7 39 58.00	2.0774	20 17 45.6	7.733
11	5 57 44.27	2.2612	24 29 4.1	2.673	11	7 42 2.51	2.0729	20 9 58.9	7.821
12	5 59 59.85	2.2583	24 26 19.9	2.798	12	7 44 6.75	2.0685	20 2 7.1	7.907
13	6 2 15.26	2.2553	24 23 28.4	2.921	13	7 46 10.73	2.0642	19 54 10.1	7.993
14	6 4 30.48	2.2522	24 20 29.4	3.044	14	7 48 14.45	2.0598	19 46 7.9	8.079
15	6 6 45.52	2.2491	24 17 23.1	3.166	15	7 50 17.90	2.0553	19 38 0.6	8.163
16	6 9 0.37	2.2458	24 14 9.5	3.288	16	7 52 21.09	2.0509	19 29 48.3	8.247
17	6 11 15.02	2.2426	24 10 48.5	3.410	17	7 54 24.01	2.0466	19 21 31.0	8.329
18	6 13 29.48	2.2393	24 7 20.3	3.530	18	7 56 26.68	2.0423	19 13 8.8	8.410
19	6 15 43.73	2.2359	24 3 44.9	3.650	19	7 58 29.08	2.0378	19 4 41.8	8.491
20	6 17 57.79	2.2325	24 0 2.3	3.769	20	8 0 31.22	2.0335	18 56 9.9	8.571
21	6 20 11.63	2.2290	23 56 12.6	3.888	21	8 2 33.10	2.0292	18 47 33.3	8.650
22	6 22 25.27	2.2256	23 52 15.7	4.006	22	8 4 34.72	2.0248	18 38 51.9	8.728
23	6 24 38.70	2.2220	+23 48 11.9	-4.123	23	8 6 36.08	2.0206	+18 30 5.9	-8.804
JULY 17.					JULY 19.				
0	6 26 51.91	2.2193	+23 44 1.0	-4.240	0	8 8 37.19	2.0163	+18 21 15.4	-8.880
1	6 29 4.90	2.2148	23 39 43.1	4.356	1	8 10 38.04	2.0120	18 12 20.3	8.956
2	6 31 17.68	2.2111	23 35 18.3	4.471	2	8 12 38.63	2.0078	18 3 20.7	9.031
3	6 33 30.23	2.2073	23 30 46.6	4.586	3	8 14 38.97	2.0036	17 54 16.6	9.105
4	6 35 42.55	2.2035	23 26 8.0	4.699	4	8 16 39.06	1.9993	17 45 8.1	9.178
5	6 37 54.65	2.1997	23 21 22.7	4.812	5	8 18 38.89	1.9951	17 35 55.3	9.248
6	6 40 6.51	2.1958	23 16 30.6	4.924	6	8 20 38.47	1.9910	17 26 38.3	9.319
7	6 42 18.14	2.1919	23 11 31.8	5.036	7	8 22 37.81	1.9868	17 17 17.0	9.390
8	6 44 29.54	2.1880	23 6 26.3	5.147	8	8 24 36.89	1.9827	17 7 51.5	9.459
9	6 46 40.70	2.1840	23 1 14.2	5.257	9	8 26 35.73	1.9786	16 58 21.9	9.528
10	6 48 51.62	2.1800	22 55 55.5	5.366	10	8 28 34.32	1.9745	16 48 48.2	9.595
11	6 51 2.30	2.1760	22 50 30.3	5.473	11	8 30 32.67	1.9704	16 39 10.5	9.661
12	6 53 12.74	2.1719	22 44 58.7	5.581	12	8 32 30.77	1.9663	16 29 28.9	9.726
13	6 55 22.93	2.1678	22 39 20.6	5.688	13	8 34 28.63	1.9624	16 19 43.4	9.792
14	6 57 32.87	2.1637	22 33 36.2	5.793	14	8 36 26.26	1.9585	16 9 53.9	9.856
15	6 59 42.57	2.1596	22 27 45.4	5.898	15	8 38 23.65	1.9545	16 0 0.7	9.918
16	7 1 52.02	2.1553	22 21 48.4	6.003	16	8 40 20.80	1.9506	15 50 3.7	9.980
17	7 4 1.21	2.1511	22 15 45.1	6.106	17	8 42 17.72	1.9467	15 40 3.1	10.042
18	7 6 10.15	2.1469	22 9 35.7	6.208	18	8 44 14.40	1.9428	15 29 58.7	10.103
19	7 8 18.84	2.1427	22 3 20.1	6.311	19	8 46 10.86	1.9391	15 19 50.8	10.162
20	7 10 27.27	2.1384	21 56 58.4	6.411	20	8 48 7.09	1.9353	15 9 39.3	10.221
21	7 12 35.45	2.1342	21 50 30.8	6.511	21	8 50 3.09	1.9315	14 59 24.3	10.279
22	7 14 43.37	2.1298	21 43 57.1	6.611	22	8 51 58.87	1.9278	14 49 5.8	10.337
23	7 16 51.02	2.1254	21 37 17.5	6.709	23	8 53 54.43	1.9242	14 38 43.9	10.392
24	7 18 58.42	2.1212	+21 30 32.0	-6.807	24	8 55 49.77	1.9205	+14 28 18.8	-10.447

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 20.					JULY 22.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	8 55 49.77	1.9205	+14 28 18.8	-10.447	0	10 24 40.03	1.8003	+5 18 1.6	-12.193
1	8 57 44.89	1.9169	14 17 50.3	10.502	1	10 26 28.01	1.7990	5 5 49.4	12.212
2	8 59 39.80	1.9134	14 7 18.6	10.556	2	10 28 15.91	1.7978	4 53 36.2	12.230
3	9 1 34.50	1.9098	13 56 43.6	10.609	3	10 30 3.75	1.7968	4 41 21.8	12.248
4	9 3 28.98	1.9063	13 46 5.5	10.661	4	10 31 51.53	1.7958	4 29 6.4	12.264
5	9 5 23.26	1.9029	13 35 24.3	10.713	5	10 33 39.24	1.7948	4 16 50.1	12.280
6	9 7 17.33	1.8995	13 24 40.0	10.763	6	10 35 26.90	1.7939	4 4 32.8	12.296
7	9 9 11.20	1.8962	13 13 52.8	10.813	7	10 37 14.51	1.7930	3 52 14.6	12.310
8	9 11 4.87	1.8929	13 3 2.5	10.862	8	10 39 2.06	1.7922	3 39 55.6	12.324
9	9 12 58.35	1.8896	12 52 9.4	10.909	9	10 40 49.57	1.7915	3 27 35.7	12.338
10	9 14 51.62	1.8863	12 41 13.4	10.957	10	10 42 37.04	1.7908	3 15 15.0	12.351
11	9 16 44.71	1.8833	12 30 14.6	11.003	11	10 44 24.47	1.7903	3 2 53.6	12.363
12	9 18 37.61	1.8801	12 19 13.0	11.049	12	10 46 11.87	1.7897	2 50 31.5	12.374
13	9 20 30.32	1.8769	12 8 8.7	11.093	13	10 47 59.23	1.7892	2 38 8.7	12.385
14	9 22 22.84	1.8739	11 57 1.8	11.138	14	10 49 46.57	1.7888	2 25 45.3	12.395
15	9 24 15.19	1.8709	11 45 52.2	11.181	15	10 51 33.88	1.7883	2 13 21.3	12.404
16	9 26 7.35	1.8679	11 34 40.1	11.223	16	10 53 21.17	1.7881	2 0 56.8	12.413
17	9 27 59.34	1.8651	11 23 25.4	11.265	17	10 55 8.45	1.7878	1 48 31.7	12.422
18	9 29 51.16	1.8622	11 12 8.3	11.306	18	10 56 55.71	1.7876	1 36 6.2	12.428
19	9 31 42.80	1.8593	11 0 48.7	11.347	19	10 58 42.96	1.7875	1 23 40.3	12.436
20	9 33 34.28	1.8566	10 49 26.7	11.386	20	11 0 30.21	1.7874	1 11 13.9	12.443
21	9 35 25.59	1.8538	10 38 2.4	11.424	21	11 2 17.45	1.7874	0 58 47.2	12.448
22	9 37 16.74	1.8512	10 26 35.8	11.462	22	11 4 4.70	1.7875	0 46 20.2	12.452
23	9 39 7.73	1.8485	+10 15 7.0	-11.499	23	11 5 51.95	1.7877	+0 33 53.0	-12.456
JULY 21.					JULY 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 40 58.56	1.8459	+10 3 35.9	-11.536	0	11 7 39.22	1.7879	+0 21 25.5	-12.460
1	9 42 49.24	1.8434	9 52 2.7	11.572	1	11 9 26.50	1.7881	+0 8 57.8	-12.463
2	9 44 39.77	1.8410	9 40 27.3	11.607	2	11 11 13.79	1.7884	-0 3 30.0	12.465
3	9 46 30.16	1.8386	9 28 49.9	11.640	3	11 13 1.11	1.7888	0 15 58.0	12.467
4	9 48 20.40	1.8362	9 17 10.5	11.674	4	11 14 48.44	1.7892	0 28 26.0	12.468
5	9 50 10.50	1.8339	9 5 29.0	11.707	5	11 16 35.81	1.7898	0 40 54.1	12.468
6	9 52 0.47	1.8317	8 53 45.7	11.738	6	11 18 23.21	1.7903	0 53 22.2	12.468
7	9 53 50.30	1.8294	8 42 0.4	11.770	7	11 20 10.65	1.7909	1 5 50.3	12.468
8	9 55 40.00	1.8273	8 30 13.3	11.801	8	11 21 58.12	1.7916	1 18 18.3	12.465
9	9 57 29.57	1.8252	8 18 24.3	11.831	9	11 23 45.64	1.7924	1 30 46.1	12.463
10	9 59 19.02	1.8231	8 6 33.6	11.860	10	11 25 33.21	1.7932	1 43 13.9	12.461
11	10 1 8.34	1.8211	7 54 41.1	11.888	11	11 27 20.82	1.7941	1 55 41.4	12.457
12	10 2 57.55	1.8192	7 42 47.0	11.916	12	11 29 8.50	1.7951	2 8 8.7	12.453
13	10 4 46.64	1.8173	7 30 51.2	11.943	13	11 30 56.23	1.7961	2 20 35.8	12.448
14	10 6 35.62	1.8155	7 18 53.9	11.969	14	11 32 44.03	1.7972	2 33 2.5	12.443
15	10 8 24.50	1.8137	7 6 54.9	11.995	15	11 34 31.89	1.7983	2 45 28.9	12.437
16	10 10 13.26	1.8119	6 54 54.5	12.019	16	11 36 19.83	1.7996	2 57 54.9	12.430
17	10 12 1.93	1.8103	6 42 52.6	12.043	17	11 38 7.84	1.8008	3 10 20.5	12.423
18	10 13 50.50	1.8087	6 30 49.3	12.068	18	11 39 55.92	1.8022	3 22 45.6	12.415
19	10 15 38.97	1.8071	6 18 44.5	12.090	19	11 41 44.10	1.8036	3 35 10.3	12.407
20	10 17 27.35	1.8056	6 6 38.5	12.112	20	11 43 32.35	1.8050	3 47 34.4	12.397
21	10 19 15.64	1.8042	5 54 31.1	12.134	21	11 45 20.70	1.8067	3 59 57.9	12.387
22	10 21 3.85	1.8028	5 42 22.4	12.154	22	11 47 9.15	1.8083	4 12 20.8	12.376
23	10 22 51.98	1.8015	5 30 12.6	12.173	23	11 48 57.69	1.8098	4 24 43.0	12.364
24	10 24 40.03	1.8003	+ 5 18 1.6	-12.193	24	11 50 46.33	1.8116	-4 37 4.5	-12.353

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 24.					JULY 26.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 50 46.33	1.8116	- 4 37 4.5	-12.353	0	13 20 59.95	1.9732	-14 2 25.1	-10.903
1	11 52 35.08	1.8135	4 49 25.3	12.340	1	13 22 58.49	1.9781	14 13 17.8	10.853
2	11 54 23.95	1.8153	5 1 45.3	12.326	2	13 24 57.32	1.9831	14 24 7.4	10.802
3	11 56 12.92	1.8173	5 14 4.4	12.312	3	13 26 56.46	1.9882	14 34 54.0	10.749
4	11 58 2.02	1.8193	5 26 22.7	12.298	4	13 28 55.90	1.9933	14 45 37.3	10.695
5	11 59 51.23	1.8213	5 38 40.1	12.283	5	13 30 55.66	1.9985	14 56 17.4	10.641
6	12 1 40.58	1.8235	5 50 56.6	12.266	6	13 32 55.72	2.0038	15 6 54.2	10.586
7	12 3 30.05	1.8257	6 3 12.0	12.249	7	13 34 56.11	2.0091	15 17 27.7	10.529
8	12 5 19.66	1.8280	6 15 26.5	12.232	8	13 36 56.81	2.0143	15 27 57.7	10.472
9	12 7 9.41	1.8303	6 27 39.8	12.213	9	13 38 57.83	2.0198	15 38 24.3	10.413
10	12 8 59.30	1.8327	6 39 52.1	12.194	10	13 40 59.18	2.0253	15 48 47.3	10.353
11	12 10 49.33	1.8351	6 52 3.1	12.174	11	13 43 0.86	2.0308	15 59 6.7	10.293
12	12 12 39.51	1.8377	7 4 13.0	12.154	12	13 45 2.87	2.0363	16 9 22.5	10.232
13	12 14 29.85	1.8403	7 16 21.6	12.133	13	13 47 5.22	2.0420	16 19 34.5	10.169
14	12 16 20.35	1.8430	7 28 29.0	12.112	14	13 49 7.91	2.0477	16 29 42.8	10.106
15	12 18 11.01	1.8458	7 40 35.0	12.088	15	13 51 10.94	2.0534	16 39 47.2	10.040
16	12 20 1.84	1.8485	7 52 39.6	12.065	16	13 53 14.32	2.0593	16 49 47.6	9.974
17	12 21 52.83	1.8514	8 4 42.8	12.042	17	13 55 18.05	2.0650	16 59 44.1	9.908
18	12 23 44.01	1.8544	8 16 44.6	12.017	18	13 57 22.12	2.0709	17 9 36.6	9.841
19	12 25 35.36	1.8573	8 28 44.8	11.991	19	13 59 26.56	2.0769	17 19 25.0	9.771
20	12 27 26.89	1.8603	8 40 43.5	11.965	20	14 1 31.35	2.0828	17 29 9.1	9.701
21	12 29 18.60	1.8635	8 52 40.6	11.938	21	14 3 36.50	2.0888	17 38 49.1	9.630
22	12 31 10.51	1.8668	9 4 36.1	11.910	22	14 5 42.01	2.0949	17 48 24.7	9.558
23	12 33 2.61	1.8700	- 9 16 29.8	-11.881	23	14 7 47.89	2.1011	-17 57 56.0	-9.485
JULY 25.					JULY 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	12 34 54.91	1.8734	- 9 28 21.8	-11.852	0	14 9 54.14	2.1073	-18 7 22.9	-9.410
1	12 36 47.42	1.8768	9 40 12.0	11.823	1	14 12 0.76	2.1134	18 16 45.2	9.334
2	12 38 40.13	1.8803	9 52 0.5	11.792	2	14 14 7.75	2.1197	18 26 3.0	9.257
3	12 40 33.05	1.8838	10 3 47.0	11.760	3	14 16 15.12	2.1259	18 35 16.0	9.178
4	12 42 26.18	1.8874	10 15 31.7	11.728	4	14 18 22.86	2.1322	18 44 24.4	9.100
5	12 44 19.54	1.8911	10 27 14.3	11.694	5	14 20 30.98	2.1386	18 53 28.0	9.019
6	12 46 13.11	1.8948	10 38 55.0	11.661	6	14 22 39.49	2.1450	19 2 26.7	8.938
7	12 48 6.91	1.8987	10 50 33.6	11.625	7	14 24 48.38	2.1514	19 11 20.5	8.855
8	12 50 0.95	1.9025	11 2 10.0	11.590	8	14 26 57.66	2.1579	19 20 9.3	8.771
9	12 51 55.21	1.9064	11 13 44.4	11.554	9	14 29 7.33	2.1643	19 28 53.0	8.686
10	12 53 49.72	1.9104	11 25 16.5	11.516	10	14 31 17.38	2.1708	19 37 31.6	8.600
11	12 55 44.46	1.9145	11 36 46.3	11.478	11	14 33 27.83	2.1774	19 46 5.0	8.513
12	12 57 39.46	1.9187	11 48 13.9	11.440	12	14 35 38.67	2.1840	19 54 33.1	8.423
13	12 59 34.70	1.9228	11 59 39.1	11.399	13	14 37 49.91	2.1906	20 2 55.8	8.333
14	13 1 30.20	1.9271	12 11 1.8	11.358	14	14 40 1.54	2.1973	20 11 13.1	8.242
15	13 3 25.95	1.9314	12 22 22.1	11.318	15	14 42 13.58	2.2039	20 19 24.8	8.148
16	13 5 21.97	1.9358	12 33 39.9	11.275	16	14 44 26.01	2.2106	20 27 30.9	8.055
17	13 7 18.25	1.9403	12 44 55.1	11.232	17	14 46 38.85	2.2173	20 35 31.4	7.961
18	13 9 14.80	1.9448	12 56 7.7	11.188	18	14 48 52.08	2.2239	20 43 26.2	7.864
19	13 11 11.62	1.9493	13 7 17.6	11.143	19	14 51 5.72	2.2308	20 51 15.1	7.766
20	13 13 8.72	1.9540	13 18 24.8	11.097	20	14 53 19.77	2.2374	20 58 58.1	7.667
21	13 15 6.10	1.9587	13 29 29.2	11.049	21	14 55 34.21	2.2441	21 6 35.1	7.567
22	13 17 3.76	1.9634	13 40 30.7	11.002	22	14 57 49.06	2.2509	21 14 6.1	7.466
23	13 19 1.71	1.9683	13 51 29.4	10.953	23	15 0 4.32	2.2577	21 21 31.0	7.363
24	13 20 59.95	1.9732	-14 2 25.1	-10.903	24	15 2 19.98	2.2644	-21 28 49.7	-7.259



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
JULY 28.					JULY 30.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 2 19.98	2.2644	-21 28' 49.7	-7.256	0	16 58 22.77	2.5503	-24 53 6.6	-0.791
1	15 4 36.05	2.2713	21 36 2.1	7.153	1	17 0 55.91	2.5543	24 53 49.2	0.629
2	15 6 52.53	2.2780	21 43 8.1	7.047	2	17 3 29.29	2.5583	24 54 22.1	0.467
3	15 9 9.41	2.2848	21 50 7.7	6.939	3	17 6 2.91	2.5623	24 54 45.2	0.303
4	15 11 26.70	2.2915	21 57 0.8	6.830	4	17 8 36.76	2.5661	24 54 58.5	-0.140
5	15 13 44.39	2.2983	22 3 47.3	6.719	5	17 11 10.84	2.5698	24 55 2.0	+0.025
6	15 16 2.49	2.3051	22 10 27.1	6.608	6	17 13 45.13	2.5733	24 54 55.5	0.191
7	15 18 21.00	2.3118	22 17 0.2	6.494	7	17 16 19.63	2.5768	24 54 39.1	0.356
8	15 20 39.90	2.3185	22 23 26.4	6.380	8	17 18 54.34	2.5800	24 54 12.8	0.523
9	15 22 59.22	2.3253	22 29 45.8	6.264	9	17 21 29.23	2.5832	24 53 36.4	0.691
10	15 25 18.93	2.3319	22 35 58.1	6.147	10	17 24 4.32	2.5863	24 52 49.9	0.858
11	15 27 39.05	2.3386	22 42 3.4	6.029	11	17 26 39.59	2.5893	24 51 53.4	1.027
12	15 29 59.56	2.3453	22 48 1.6	5.910	12	17 29 15.03	2.5920	24 50 46.7	1.196
13	15 32 20.48	2.3519	22 53 52.6	5.788	13	17 31 50.63	2.5947	24 49 29.9	1.365
14	15 34 41.79	2.3585	22 59 36.2	5.666	14	17 34 26.39	2.5973	24 48 2.9	1.535
15	15 37 3.50	2.3652	23 5 12.5	5.543	15	17 37 2.30	2.5997	24 46 25.7	1.705
16	15 39 25.61	2.3718	23 10 41.3	5.417	16	17 39 38.35	2.6019	24 44 38.3	1.876
17	15 41 48.11	2.3783	23 16 2.5	5.291	17	17 42 14.53	2.6041	24 42 40.6	2.047
18	15 44 11.00	2.3847	23 21 16.2	5.164	18	17 44 50.84	2.6062	24 40 32.7	2.218
19	15 46 34.27	2.3912	23 26 22.2	5.035	19	17 47 27.27	2.6080	24 38 14.4	2.390
20	15 48 57.94	2.3976	23 31 20.4	4.905	20	17 50 3.80	2.6098	24 35 45.9	2.561
21	15 51 21.98	2.4039	23 36 10.8	4.774	21	17 52 40.44	2.6113	24 33 7.1	2.733
22	15 53 46.41	2.4103	23 40 53.3	4.642	22	17 55 17.16	2.6128	24 30 17.9	2.906
23	15 56 11.22	2.4166	-23 45 27.8	-4.508	23	17 57 53.98	2.6143	-24 27 18.4	+3.078
JULY 29.					JULY 31.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 58 36.40	2.4228	-23 49 54.3	-4.373	0	18 0 30.87	2.6154	-24 24 8.6	+3.250
1	16 1 1.95	2.4290	23 54 12.6	4.237	1	18 3 7.83	2.6165	24 20 48.4	3.423
2	16 3 27.88	2.4351	23 58 22.7	4.099	2	18 5 44.85	2.6174	24 17 17.8	3.596
3	16 5 54.16	2.4411	24 2 24.5	3.960	3	18 8 21.92	2.6182	24 13 36.9	3.768
4	16 8 20.81	2.4472	24 6 17.9	3.820	4	18 10 59.03	2.6188	24 9 45.6	3.941
5	16 10 47.82	2.4531	24 10 2.9	3.679	5	18 13 36.18	2.6194	24 5 44.0	4.113
6	16 13 15.18	2.4589	24 13 39.4	3.538	6	18 16 13.36	2.6198	24 1 32.1	4.285
7	16 15 42.89	2.4647	24 17 7.4	3.394	7	18 18 50.56	2.6201	23 57 9.8	4.458
8	16 18 10.94	2.4704	24 20 26.7	3.248	8	18 21 27.77	2.6203	23 52 37.2	4.629
9	16 20 39.34	2.4761	24 23 37.2	3.103	9	18 24 4.99	2.6203	23 47 54.3	4.801
10	16 23 8.07	2.4816	24 26 39.1	2.957	10	18 26 42.20	2.6201	23 43 1.1	4.973
11	16 25 37.13	2.4871	24 29 32.0	2.808	11	18 29 19.40	2.6198	23 37 57.6	5.143
12	16 28 6.52	2.4925	24 32 16.1	2.660	12	18 31 56.58	2.6194	23 32 44.0	5.313
13	16 30 36.23	2.4979	24 34 51.2	2.509	13	18 34 33.73	2.6189	23 27 20.1	5.484
14	16 33 6.27	2.5032	24 37 17.2	2.358	14	18 37 10.85	2.6183	23 21 45.9	5.655
15	16 35 36.61	2.5083	24 39 34.1	2.205	15	18 39 47.93	2.6175	23 16 1.5	5.823
16	16 38 7.26	2.5133	24 41 41.8	2.053	16	18 42 24.95	2.6166	23 10 7.1	5.992
17	16 40 38.20	2.5183	24 43 40.4	1.898	17	18 45 1.92	2.6157	23 4 2.5	6.161
18	16 43 9.45	2.5232	24 45 29.6	1.743	18	18 47 38.83	2.6145	22 57 47.8	6.329
19	16 45 40.98	2.5279	24 47 9.5	1.586	19	18 50 15.66	2.6132	22 51 23.0	6.496
20	16 48 12.80	2.5326	24 48 39.9	1.428	20	18 52 52.41	2.6118	22 44 48.3	6.663
21	16 50 44.89	2.5372	24 50 0.9	1.271	21	18 55 29.08	2.6104	22 38 3.5	6.828
22	16 53 17.26	2.5416	24 51 12.4	1.112	22	18 58 5.66	2.6088	22 31 8.9	6.993
23	16 55 49.88	2.5459	24 52 14.3	0.952	23	19 0 42.14	2.6070	22 24 4.4	7.158
24	16 58 22.77	2.5503	-24 53 6.6	-0.791	24	19 3 18.50	2.6051	-22 16 50.0	+7.322

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.				
AUGUST 1.							AUGUST 3.										
	h	m	s	s	°	'	''		h	m	s	s	°	'	''	''	
0	19	3	18.50	2.6051	-22	16	50.0	+7.322	0	21	4	42.75	2.4343	-13	39	49.0	+13.636
1	19	5	54.75	2.6033	22	9	25.8	7.484	1	21	7	8.67	2.4299	13	26	8.1	13.726
2	19	8	30.89	2.6013	22	1	51.9	7.646	2	21	9	34.34	2.4258	13	12	21.9	13.814
3	19	11	6.90	2.5991	21	54	8.3	7.807	3	21	11	59.76	2.4215	12	58	30.4	13.901
4	19	13	42.78	2.5968	21	46	15.1	7.966	4	21	14	24.92	2.4173	12	44	33.8	13.985
5	19	16	18.52	2.5945	21	38	12.4	8.125	5	21	16	49.83	2.4130	12	30	32.2	14.068
6	19	18	54.12	2.5920	21	30	0.1	8.284	6	21	19	14.48	2.4088	12	16	25.7	14.148
7	19	21	29.56	2.5895	21	21	38.3	8.441	7	21	21	38.89	2.4048	12	2	14.4	14.227
8	19	24	4.86	2.5869	21	13	7.2	8.596	8	21	24	3.05	2.4005	11	47	58.5	14.303
9	19	26	39.99	2.5841	21	4	26.8	8.751	9	21	26	26.95	2.3964	11	33	38.1	14.378
10	19	29	14.95	2.5813	20	55	37.1	8.905	10	21	28	50.62	2.3923	11	19	13.2	14.450
11	19	31	49.75	2.5784	20	46	38.2	9.058	11	21	31	14.03	2.3883	11	4	44.1	14.521
12	19	34	24.36	2.5753	20	37	30.2	9.208	12	21	33	37.21	2.3843	10	50	10.7	14.590
13	19	36	58.79	2.5723	20	28	13.2	9.358	13	21	36	0.14	2.3803	10	35	33.3	14.656
14	19	39	33.04	2.5693	20	18	47.2	9.508	14	21	38	22.84	2.3763	10	20	52.0	14.720
15	19	42	7.10	2.5660	20	9	12.3	9.654	15	21	40	45.29	2.3723	10	6	6.9	14.783
16	19	44	40.96	2.5627	19	59	28.7	9.800	16	21	43	7.52	2.3684	9	51	18.1	14.843
17	19	47	14.62	2.5593	19	49	36.3	9.946	17	21	45	29.50	2.3645	9	36	25.7	14.903
18	19	49	48.08	2.5559	19	39	35.2	10.089	18	21	47	51.26	2.3608	9	21	29.8	14.959
19	19	52	21.33	2.5524	19	29	25.6	10.231	19	21	50	12.79	2.3569	9	6	30.6	15.013
20	19	54	54.37	2.5488	19	19	7.5	10.371	20	21	52	34.09	2.3532	8	51	28.2	15.066
21	19	57	27.19	2.5452	19	8	41.1	10.510	21	21	54	55.17	2.3495	8	36	22.7	15.116
22	19	59	59.79	2.5415	18	58	6.3	10.648	22	21	57	16.03	2.3458	8	21	14.3	15.164
23	20	2	32.17	2.5378	-18	47	23.3	+10.784	23	21	59	36.66	2.3422	-8	6	3.0	+15.212
AUGUST 2.							AUGUST 4.										
0	20	5	4.33	2.5341	-18	36	32.2	+10.918	0	22	1	57.09	2.3387	-7	50	48.9	+15.257
1	20	7	36.26	2.5302	18	25	33.1	11.052	1	22	4	17.30	2.3351	7	35	32.2	15.299
2	20	10	7.95	2.5263	18	14	26.0	11.183	2	22	6	37.30	2.3317	7	20	13.0	15.339
3	20	12	39.41	2.5223	18	3	11.1	11.313	3	22	8	57.10	2.3283	7	4	51.5	15.378
4	20	15	10.63	2.5184	17	51	48.5	11.441	4	22	11	16.69	2.3248	6	49	27.6	15.415
5	20	17	41.62	2.5143	17	40	18.2	11.568	5	22	13	36.07	2.3214	6	34	1.7	15.449
6	20	20	12.36	2.5103	17	28	40.3	11.693	6	22	15	55.26	2.3183	6	18	33.7	15.483
7	20	22	42.86	2.5063	17	16	55.1	11.816	7	22	18	14.26	2.3150	6	3	3.7	15.514
8	20	25	13.11	2.5022	17	5	2.4	11.938	8	22	20	33.06	2.3118	5	47	32.0	15.543
9	20	27	43.12	2.4980	16	53	2.6	12.057	9	22	22	51.68	2.3088	5	31	58.6	15.570
10	20	30	12.87	2.4938	16	40	55.6	12.175	10	22	25	10.11	2.3057	5	16	23.6	15.596
11	20	32	42.38	2.4897	16	28	41.6	12.292	11	22	27	28.36	2.3026	5	0	47.1	15.618
12	20	35	11.63	2.4854	16	16	20.6	12.407	12	22	29	46.42	2.2997	4	45	9.4	15.639
13	20	37	40.63	2.4813	16	3	52.8	12.518	13	22	32	4.32	2.2968	4	29	30.4	15.658
14	20	40	9.38	2.4770	15	51	18.4	12.629	14	22	34	22.04	2.2940	4	13	50.4	15.676
15	20	42	37.87	2.4727	15	38	37.3	12.738	15	22	36	39.60	2.2913	3	58	9.3	15.693
16	20	45	6.10	2.4684	15	25	49.8	12.846	16	22	38	56.99	2.2885	3	42	27.3	15.706
17	20	47	34.08	2.4642	15	12	55.8	12.952	17	22	41	14.22	2.2858	3	26	44.6	15.717
18	20	50	1.80	2.4599	14	59	55.6	13.055	18	22	43	31.29	2.2833	3	11	1.3	15.728
19	20	52	29.27	2.4557	14	46	49.2	13.157	19	22	45	48.21	2.2808	2	55	17.3	15.736
20	20	54	56.48	2.4513	14	33	36.8	13.256	20	22	48	4.98	2.2783	2	39	33.0	15.742
21	20	57	23.43	2.4471	14	20	18.5	13.354	21	22	50	21.60	2.2758	2	23	48.3	15.747
22	20	59	50.13	2.4428	14	6	54.3	13.451	22	22	52	38.08	2.2735	2	8	3.4	15.749
23	21	2	16.56	2.4385	13	53	24.4	13.544	23	22	54	54.42	2.2712	1	52	18.4	15.750
24	21	4	42.75	2.4343	-13	39	49.0	+13.636	24	22	57	10.62	2.2680	-1	36	33.4	+15.748



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 5.					AUGUST 7.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 57 10.62	2.2689	- 1 36 33.4	+15.748	0	0 44 42.15	2.2339	+10 26 25.8	+13.790
1	22 59 26.69	2.2668	1 20 48.6	15.746	1	0 46 56.20	2.2346	10 40 11.0	13.714
2	23 1 42.64	2.2648	1 5 3.9	15.742	2	0 49 10.30	2.2353	10 53 51.5	13.637
3	23 3 58.46	2.2627	0 49 19.6	15.734	3	0 51 24.43	2.2359	11 7 27.4	13.559
4	23 6 14.16	2.2607	0 33 35.8	15.727	4	0 53 38.61	2.2367	11 20 58.6	13.480
5	23 8 29.74	2.2588	0 17 52.4	15.717	5	0 55 52.83	2.2374	11 34 25.0	13.400
6	23 10 45.21	2.2569	- 0 2 9.8	15.704	6	0 58 7.10	2.2383	11 47 46.6	13.318
7	23 13 0.57	2.2552	+ 0 13 32.1	15.692	7	1 0 21.42	2.2392	12 1 3.1	13.234
8	23 15 15.83	2.2534	0 29 13.2	15.677	8	1 2 35.80	2.2400	12 14 14.7	13.151
9	23 17 30.98	2.2518	0 44 53.3	15.659	9	1 4 50.22	2.2409	12 27 21.2	13.066
10	23 19 46.04	2.2502	1 0 32.3	15.641	10	1 7 4.71	2.2419	12 40 22.6	12.979
11	23 22 1.00	2.2486	1 16 10.2	15.621	11	1 9 19.25	2.2429	12 53 18.7	12.892
12	23 24 15.87	2.2472	1 31 46.8	15.598	12	1 11 33.86	2.2440	13 6 9.6	12.804
13	23 26 30.66	2.2458	1 47 22.0	15.575	13	1 13 48.53	2.2451	13 18 55.2	12.714
14	23 28 45.36	2.2444	2 2 55.8	15.550	14	1 16 3.27	2.2462	13 31 35.3	12.623
15	23 30 59.99	2.2432	2 18 28.0	15.523	15	1 18 18.07	2.2473	13 44 10.0	12.532
16	23 33 14.54	2.2419	2 33 58.5	15.494	16	1 20 32.95	2.2485	13 56 39.1	12.439
17	23 35 29.02	2.2408	2 49 27.3	15.464	17	1 22 47.89	2.2497	14 9 2.7	12.345
18	23 37 43.43	2.2397	3 4 54.2	15.433	18	1 25 2.91	2.2509	14 21 20.5	12.250
19	23 39 57.78	2.2387	3 20 19.2	15.399	19	1 27 18.00	2.2522	14 33 32.7	12.154
20	23 42 12.07	2.2377	3 35 42.1	15.364	20	1 29 33.17	2.2535	14 45 39.0	12.058
21	23 44 26.30	2.2368	3 51 2.9	15.328	21	1 31 48.42	2.2548	14 57 39.6	11.960
22	23 46 40.48	2.2359	4 6 21.4	15.289	22	1 34 3.74	2.2560	15 9 34.2	11.861
23	23 48 54.61	2.2351	+ 4 21 37.6	+15.250	23	1 36 19.14	2.2574	+15 21 22.9	+11.761
AUGUST 6.					AUGUST 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 51 8.69	2.2343	+ 4 36 51.4	+15.208	0	1 38 34.63	2.2588	+15 33 5.5	+11.660
1	23 53 22.73	2.2338	4 52 2.6	15.166	1	1 40 50.20	2.2602	15 44 42.1	11.558
2	23 55 36.74	2.2332	5 7 11.3	15.122	2	1 43 5.85	2.2615	15 56 12.5	11.456
3	23 57 50.71	2.2326	5 22 17.2	15.076	3	1 45 21.58	2.2630	16 7 36.8	11.353
4	0 0 4.65	2.2322	5 37 20.4	15.028	4	1 47 37.41	2.2644	16 18 54.8	11.248
5	0 2 18.57	2.2318	5 52 20.6	14.979	5	1 49 53.31	2.2658	16 30 6.5	11.143
6	0 4 32.46	2.2313	6 7 17.9	14.930	6	1 52 9.31	2.2673	16 41 11.9	11.037
7	0 6 46.32	2.2310	6 22 12.2	14.878	7	1 54 25.39	2.2688	16 52 10.9	10.929
8	0 9 0.18	2.2308	6 37 3.3	14.825	8	1 56 41.57	2.2703	17 3 3.4	10.821
9	0 11 14.01	2.2305	6 51 51.2	14.770	9	1 58 57.83	2.2718	17 13 49.4	10.712
10	0 13 27.84	2.2304	7 6 35.7	14.714	10	2 1 14.18	2.2733	17 24 28.8	10.603
11	0 15 41.66	2.2303	7 21 16.9	14.658	11	2 3 30.62	2.2748	17 35 1.7	10.492
12	0 17 55.47	2.2303	7 35 54.6	14.598	12	2 5 47.16	2.2763	17 45 27.8	10.380
13	0 20 9.29	2.2303	7 50 28.7	14.538	13	2 8 3.78	2.2778	17 55 47.3	10.268
14	0 22 23.11	2.2303	8 4 59.2	14.477	14	2 10 20.50	2.2793	18 6 0.0	10.155
15	0 24 36.93	2.2305	8 19 25.9	14.414	15	2 12 37.30	2.2808	18 16 5.9	10.042
16	0 26 50.77	2.2308	8 33 48.9	14.350	16	2 14 54.19	2.2823	18 26 5.0	9.928
17	0 29 4.62	2.2309	8 48 7.9	14.284	17	2 17 11.18	2.2838	18 35 57.2	9.813
18	0 31 18.48	2.2312	9 2 23.0	14.218	18	2 19 28.25	2.2853	18 45 42.5	9.696
19	0 33 32.36	2.2315	9 16 34.0	14.149	19	2 21 45.42	2.2869	18 55 20.7	9.579
20	0 35 46.26	2.2319	9 30 40.9	14.081	20	2 24 2.68	2.2883	19 4 52.0	9.462
21	0 38 0.19	2.2323	9 44 43.7	14.010	21	2 26 20.02	2.2898	19 14 16.2	9.343
22	0 40 14.14	2.2328	9 58 42.1	13.938	22	2 28 37.46	2.2914	19 23 33.2	9.225
23	0 42 28.13	2.2334	10 12 36.2	13.864	23	2 30 54.99	2.2928	19 32 43.2	9.106
24	0 44 42.15	2.2339	+10 26 25.8	+13.790	24	2 33 12.60	2.2943	+19 41 45.9	+ 8.985

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
AUGUST 9.									AUGUST 11.								
	h	m	s	s	"	"				h	m	s	s	"	"		
0	2	33	12.60	2.2943	+19 41 45.9	+8.985	0	4	24	27.59	2.3244	+24 25 16.2	+2.704				
1	2	35	30.30	2.2957	19 50 41.4	8.865	1	4	26	47.04	2.3238	24 27 54.4	2.569				
2	2	37	48.08	2.2971	19 59 29.7	8.743	2	4	29	6.44	2.3231	24 30 24.5	2.434				
3	2	40	5.95	2.2986	20 8 10.6	8.621	3	4	31	25.81	2.3223	24 32 46.5	2.298				
4	2	42	23.91	2.3000	20 16 44.2	8.498	4	4	33	45.12	2.3215	24 35 0.3	2.163				
5	2	44	41.95	2.3013	20 25 10.4	8.375	5	4	36	4.39	2.3206	24 37 6.0	2.028				
6	2	47	0.06	2.3026	20 33 29.2	8.252	6	4	38	23.59	2.3196	24 39 3.6	1.892				
7	2	49	18.26	2.3040	20 41 40.6	8.128	7	4	40	42.74	2.3187	24 40 53.0	1.757				
8	2	51	36.54	2.3053	20 49 44.5	8.002	8	4	43	1.83	2.3176	24 42 34.4	1.623				
9	2	53	54.90	2.3066	20 57 40.8	7.876	9	4	45	20.85	2.3164	24 44 7.7	1.488				
10	2	56	13.33	2.3078	21 5 29.6	7.751	10	4	47	39.80	2.3152	24 45 32.9	1.353				
11	2	58	31.83	2.3090	21 13 10.9	7.624	11	4	49	58.67	2.3139	24 46 50.0	1.218				
12	3	0	50.41	2.3103	21 20 44.5	7.497	12	4	52	17.47	2.3126	24 47 59.0	1.083				
13	3	3	9.06	2.3114	21 28 10.5	7.369	13	4	54	36.18	2.3112	24 49 0.0	0.950				
14	3	5	27.78	2.3126	21 35 28.8	7.241	14	4	56	54.81	2.3097	24 49 53.0	0.817				
15	3	7	46.57	2.3137	21 42 39.4	7.113	15	4	59	13.34	2.3081	24 50 38.0	0.683				
16	3	10	5.42	2.3148	21 49 42.3	6.984	16	5	1	31.78	2.3065	24 51 15.0	0.549				
17	3	12	24.34	2.3158	21 56 37.5	6.855	17	5	3	50.12	2.3048	24 51 43.9	0.416				
18	3	14	43.32	2.3168	22 3 24.9	6.724	18	5	6	8.36	2.3031	24 52 4.9	0.284				
19	3	17	2.35	2.3178	22 10 4.4	6.593	19	5	8	26.49	2.3013	24 52 18.0	0.152				
20	3	19	21.45	2.3187	22 16 36.1	6.463	20	5	10	44.52	2.2995	24 52 23.1	+0.019				
21	3	21	40.59	2.3195	22 23 0.0	6.333	21	5	13	2.43	2.2975	24 52 20.3	-0.113				
22	3	23	59.79	2.3204	22 29 16.0	6.201	22	5	15	20.22	2.2955	24 52 9.6	0.243				
23	3	26	19.04	2.3212	+22 35 24.1	+6.069	23	5	17	37.89	2.2934	+24 51 51.1	-0.375				
AUGUST 10.									AUGUST 12.								
	h	m	s	s	"	"				h	m	s	s	"	"		
0	3	28	38.33	2.3219	+22 41 24.3	+5.938	0	5	19	55.43	2.2913	+24 51 21.6	-0.505				
1	3	30	57.67	2.3227	22 47 16.6	5.805	1	5	22	12.84	2.2892	24 50 50.4	0.636				
2	3	33	17.05	2.3233	22 53 0.9	5.672	2	5	21	30.13	2.2869	24 50 8.3	0.767				
3	3	35	36.46	2.3239	22 58 37.2	5.538	3	5	26	47.27	2.2846	24 49 18.4	0.906				
4	3	37	55.92	2.3245	23 4 5.5	5.406	4	5	29	4.28	2.2823	24 48 20.8	1.024				
5	3	40	15.40	2.3250	23 9 25.9	5.273	5	5	31	21.14	2.2798	24 47 15.5	1.153				
6	3	42	34.92	2.3255	23 14 38.2	5.138	6	5	33	37.86	2.2773	24 46 2.5	1.282				
7	3	44	54.46	2.3259	23 19 42.5	5.004	7	5	35	54.42	2.2748	24 44 41.7	1.409				
8	3	47	14.03	2.3263	23 24 38.7	4.869	8	5	38	10.83	2.2723	24 43 13.4	1.536				
9	3	49	33.61	2.3266	23 29 26.8	4.735	9	5	40	27.09	2.2696	24 41 37.4	1.663				
10	3	51	53.22	2.3269	23 34 6.9	4.601	10	5	42	43.18	2.2668	24 39 53.8	1.790				
11	3	54	12.84	2.3271	23 38 38.9	4.466	11	5	44	59.11	2.2641	24 38 2.6	1.915				
12	3	56	32.47	2.3273	23 43 2.8	4.331	12	5	47	14.87	2.2613	24 36 4.0	2.040				
13	3	58	52.11	2.3273	23 47 18.6	4.196	13	5	49	30.46	2.2584	24 33 57.8	2.166				
14	4	1	11.75	2.3273	23 51 26.3	4.061	14	5	51	45.88	2.2554	24 31 44.1	2.290				
15	4	3	31.39	2.3273	23 55 25.9	3.926	15	5	54	1.11	2.2524	24 29 23.0	2.413				
16	4	5	51.03	2.3273	23 59 17.4	3.791	16	5	56	16.17	2.2495	24 26 54.5	2.536				
17	4	8	10.66	2.3271	24 3 0.8	3.655	17	5	58	31.05	2.2463	24 24 18.7	2.658				
18	4	10	30.28	2.3269	24 6 36.0	3.518	18	6	0	45.73	2.2432	24 21 35.5	2.782				
19	4	12	49.89	2.3267	24 10 3.0	3.383	19	6	3	0.23	2.2401	24 18 44.9	2.903				
20	4	15	9.48	2.3263	24 13 22.0	3.248	20	6	5	14.54	2.2368	24 15 47.2	3.023				
21	4	17	29.05	2.3259	24 16 32.7	3.112	21	6	7	28.65	2.2335	24 12 42.2	3.143				
22	4	19	48.59	2.3255	24 19 35.4	2.977	22	6	9	42.56	2.2302	24 9 30.0	3.263				
23	4	22	8.11	2.3250	24 22 29.9	2.840	23	6	11	56.27	2.2268	24 6 10.6	3.382				
24	4	24	27.59	2.3244	+24 25 16.2	+2.704	24	6	14	9.78	2.2234	+24 2 44.2	-3.499				

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 13.					AUGUST 15.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	6 14 9.78	2.2234	+24 2 44.2	-3.499	0	7 56 24.73	2.0313	+19 12 11.2	-8.305
1	6 16 23.08	2.2200	23 59 10.7	3.618	1	7 58 26.49	2.0273	19 3 50.5	8.386
2	6 18 36.18	2.2166	23 55 30.1	3.735	2	8 0 28.00	2.0232	18 55 24.9	8.465
3	6 20 49.07	2.2130	23 51 42.5	3.851	3	8 2 29.27	2.0191	18 46 54.7	8.543
4	6 23 1.74	2.2093	23 47 48.0	3.967	4	8 4 30.29	2.0150	18 38 19.7	8.622
5	6 25 14.19	2.2058	23 43 46.5	4.082	5	8 6 31.07	2.0110	18 29 40.1	8.698
6	6 27 26.43	2.2022	23 39 38.2	4.196	6	8 8 31.61	2.0069	18 20 56.0	8.773
7	6 29 38.45	2.1985	23 35 23.0	4.310	7	8 10 31.90	2.0028	18 12 7.3	8.849
8	6 31 50.25	2.1948	23 31 1.0	4.423	8	8 12 31.95	1.9988	18 3 14.1	8.924
9	6 34 1.82	2.1910	23 26 32.3	4.535	9	8 14 31.76	1.9948	17 54 16.4	8.998
10	6 36 13.17	2.1872	23 21 56.8	4.647	10	8 16 31.33	1.9909	17 45 14.4	9.070
11	6 38 24.28	2.1833	23 17 14.7	4.757	11	8 18 30.67	1.9870	17 36 8.0	9.142
12	6 40 35.17	2.1796	23 12 26.0	4.867	12	8 20 29.77	1.9830	17 26 57.4	9.213
13	6 42 45.83	2.1757	23 7 30.7	4.977	13	8 22 28.63	1.9791	17 17 42.5	9.283
14	6 44 56.25	2.1718	23 2 28.8	5.085	14	8 24 27.26	1.9753	17 8 23.4	9.353
15	6 47 6.44	2.1679	22 57 20.5	5.193	15	8 26 25.66	1.9714	16 59 0.2	9.421
16	6 49 16.40	2.1639	22 52 5.7	5.300	16	8 28 23.83	1.9675	16 49 32.9	9.489
17	6 51 26.11	2.1599	22 46 44.5	5.406	17	8 30 21.76	1.9637	16 40 1.5	9.556
18	6 53 35.59	2.1560	22 41 17.0	5.512	18	8 32 19.47	1.9600	16 30 26.2	9.622
19	6 55 44.83	2.1519	22 35 43.1	5.617	19	8 34 16.96	1.9563	16 20 46.9	9.688
20	6 57 53.82	2.1478	22 30 3.0	5.721	20	8 36 14.22	1.9525	16 11 3.7	9.753
21	7 0 2.57	2.1438	22 24 16.6	5.824	21	8 38 11.26	1.9488	16 1 16.6	9.816
22	7 2 11.08	2.1398	22 18 24.1	5.926	22	8 40 8.08	1.9452	15 51 25.8	9.878
23	7 4 19.35	2.1357	+22 12 25.5	-6.028	23	8 42 4.68	1.9415	+15 41 31.3	-9.940
AUGUST 14.					AUGUST 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	7 6 27.36	2.1315	+22 6 20.8	-6.128	0	8 44 1.06	1.9379	+15 31 33.0	-10.002
1	7 8 35.13	2.1274	22 0 10.1	6.228	1	8 45 57.23	1.9343	15 21 31.1	10.062
2	7 10 42.65	2.1233	21 53 53.4	6.328	2	8 47 53.18	1.9308	15 11 25.6	10.121
3	7 12 49.93	2.1192	21 47 30.7	6.427	3	8 49 48.93	1.9273	15 1 16.6	10.180
4	7 14 56.95	2.1150	21 41 2.2	6.524	4	8 51 44.46	1.9238	14 51 4.0	10.238
5	7 17 3.73	2.1108	21 34 27.8	6.621	5	8 53 39.79	1.9204	14 40 48.0	10.295
6	7 19 10.25	2.1067	21 27 47.7	6.717	6	8 55 34.91	1.9170	14 30 28.6	10.351
7	7 21 16.53	2.1025	21 21 1.8	6.813	7	8 57 29.83	1.9137	14 20 5.9	10.406
8	7 23 22.55	2.0983	21 14 10.2	6.907	8	8 59 24.55	1.9103	14 9 39.9	10.461
9	7 25 28.32	2.0941	21 7 13.0	7.000	9	9 1 19.07	1.9070	13 59 10.6	10.515
10	7 27 33.84	2.0899	21 0 10.2	7.093	10	9 3 13.39	1.9038	13 48 38.1	10.568
11	7 29 39.11	2.0858	20 53 1.8	7.186	11	9 5 7.52	1.9005	13 38 2.4	10.621
12	7 31 44.13	2.0816	20 45 47.9	7.277	12	9 7 1.45	1.8973	13 27 23.6	10.672
13	7 33 48.90	2.0773	20 38 28.6	7.367	13	9 8 55.20	1.8943	13 16 41.8	10.723
14	7 35 53.41	2.0731	20 31 3.9	7.457	14	9 10 48.76	1.8911	13 5 56.9	10.773
15	7 37 57.67	2.0689	20 23 33.8	7.545	15	9 12 42.13	1.8880	12 55 9.1	10.821
16	7 40 1.68	2.0648	20 15 58.5	7.633	16	9 14 35.32	1.8850	12 44 18.4	10.869
17	7 42 5.44	2.0606	20 8 17.9	7.720	17	9 16 28.33	1.8820	12 33 24.8	10.918
18	7 44 8.95	2.0563	20 0 32.1	7.806	18	9 18 21.16	1.8791	12 22 28.3	10.964
19	7 46 12.21	2.0522	19 52 41.2	7.891	19	9 20 13.82	1.8763	12 11 29.1	11.009
20	7 48 15.21	2.0480	19 44 45.2	7.976	20	9 22 6.31	1.8734	12 0 27.2	11.055
21	7 50 17.97	2.0438	19 36 44.1	8.059	21	9 23 58.63	1.8705	11 49 22.5	11.100
22	7 52 20.47	2.0397	19 28 38.1	8.142	22	9 25 50.77	1.8678	11 38 15.2	11.143
23	7 54 22.73	2.0355	19 20 27.1	8.224	23	9 27 42.76	1.8650	11 27 5.4	11.186
24	7 56 24.73	2.0313	+19 12 11.2	-8.305	24	9 29 34.57	1.8623	+11 15 52.9	-11.228

## GREENWICH MEAN TIME.

Decr.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
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AUGUST 17.					AUGUST 19.				
	h	m	s	"		h	m	s	"
0	9	29	34.57	1.8022	+11	10	56	47.33	1.7912
1	9	31	26.23	1.8597		10	58	34.79	1.7910
2	9	33	17.73	1.8571		11	0	22.25	1.7909
3	9	35	9.08	1.8546		11	2	9.70	1.7908
4	9	37	0.28	1.8521		11	3	57.14	1.7908
5	9	38	51.33	1.8497		11	5	44.59	1.7908
6	9	40	42.24	1.8473		11	7	32.04	1.7909
7	9	42	33.00	1.8448		11	9	19.50	1.7911
8	9	44	23.62	1.8425		11	11	6.97	1.7913
9	9	46	14.10	1.8403		11	12	54.45	1.7915
10	9	48	4.45	1.8380		11	14	41.95	1.7919
11	9	49	54.66	1.8358		11	16	29.48	1.7923
12	9	51	44.75	1.8338		11	18	17.02	1.7926
13	9	53	34.71	1.8316		11	20	4.59	1.7932
14	9	55	24.54	1.8296		11	21	52.20	1.7938
15	9	57	14.26	1.8276		11	23	39.84	1.7943
16	9	59	3.85	1.8257		11	25	27.52	1.7949
17	10	0	53.34	1.8238		11	27	15.23	1.7957
18	10	2	42.71	1.8219		11	29	3.00	1.7965
19	10	4	31.97	1.8202		11	30	50.81	1.7973
20	10	6	21.13	1.8185		11	32	38.68	1.7983
21	10	8	10.19	1.8168		11	34	26.60	1.7992
22	10	9	59.14	1.8151		11	36	14.58	1.8002
23	10	11	48.00	1.8136	+ 6	11	38	2.62	1.8013

AUGUST 18.					AUGUST 20.				
	h	m	s	"		h	m	s	"
0	10	13	36.77	1.8121	+ 6	11	39	50.73	1.8024
1	10	15	25.45	1.8105		11	41	38.91	1.8035
2	10	17	14.03	1.8091		11	43	27.15	1.8048
3	10	19	2.54	1.8078		11	45	15.48	1.8061
4	10	20	50.96	1.8064		11	47	3.88	1.8074
5	10	22	39.31	1.8052		11	48	52.37	1.8089
6	10	24	27.58	1.8038		11	50	40.95	1.8103
7	10	26	15.77	1.8027		11	52	29.61	1.8119
8	10	28	3.90	1.8017		11	54	18.38	1.8135
9	10	29	51.97	1.8007		11	56	7.23	1.8151
10	10	31	39.98	1.7996		11	57	56.19	1.8169
11	10	33	27.92	1.7986		11	59	45.26	1.8187
12	10	35	15.81	1.7978		12	1	34.43	1.8204
13	10	37	3.65	1.7968		12	3	23.71	1.8223
14	10	38	51.43	1.7960		12	5	13.11	1.8243
15	10	40	39.17	1.7953		12	7	2.62	1.8263
16	10	42	26.87	1.7947		12	8	52.26	1.8283
17	10	44	14.53	1.7940		12	10	42.02	1.8305
18	10	46	2.15	1.7935		12	12	31.92	1.8327
19	10	47	49.75	1.7930		12	14	21.94	1.8348
20	10	49	37.31	1.7924		12	16	12.10	1.8372
21	10	51	24.84	1.7921		12	18	2.40	1.8395
22	10	53	12.36	1.7918		12	19	52.84	1.8419
23	10	54	59.85	1.7914		12	21	43.43	1.8444
24	10	56	47.33	1.7912	+ 1	12	23	34.17	1.8469

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 21.					AUGUST 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	12 23 34.17	1.8469	- 8 7 20.1	-11.923	0	13 56 12.55	2.0335	-16 54 4.9	-9.697
1	12 25 25.06	1.8495	8 19 14.7	11.896	1	13 58 14.72	2.0387	17 3 44.7	9.628
2	12 27 16.11	1.8522	8 31 7.6	11.868	2	14 0 17.19	2.0438	17 13 20.3	9.559
3	12 29 7.32	1.8548	8 42 58.8	11.839	3	14 2 19.97	2.0490	17 22 51.8	9.489
4	12 30 58.69	1.8576	8 54 48.3	11.810	4	14 4 23.07	2.0543	17 32 19.0	9.418
5	12 32 50.23	1.8605	9 6 36.0	11.780	5	14 6 26.48	2.0595	17 41 42.0	9.346
6	12 34 41.95	1.8633	9 18 21.9	11.749	6	14 8 30.21	2.0648	17 51 0.5	9.272
7	12 36 33.83	1.8662	9 30 5.9	11.717	7	14 10 34.26	2.0702	18 0 14.6	9.198
8	12 38 25.89	1.8693	9 41 47.9	11.684	8	14 12 38.63	2.0755	18 9 24.3	9.123
9	12 40 18.14	1.8723	9 53 28.0	11.652	9	14 14 43.32	2.0809	18 18 29.3	9.046
10	12 42 10.57	1.8754	10 5 6.1	11.618	10	14 16 48.34	2.0864	18 27 29.8	8.969
11	12 44 3.19	1.8786	10 16 42.1	11.582	11	14 18 53.69	2.0919	18 36 25.6	8.891
12	12 45 56.00	1.8818	10 28 15.9	11.546	12	14 20 59.37	2.0974	18 45 16.7	8.812
13	12 47 49.00	1.8851	10 39 47.6	11.511	13	14 23 5.38	2.1029	18 54 3.0	8.731
14	12 49 42.21	1.8884	10 51 17.2	11.473	14	14 25 11.72	2.1085	19 2 44.4	8.649
15	12 51 35.61	1.8918	11 2 44.4	11.435	15	14 27 18.40	2.1141	19 11 20.9	8.567
16	12 53 29.22	1.8953	11 14 9.4	11.397	16	14 29 25.41	2.1197	19 19 52.4	8.483
17	12 55 23.04	1.8988	11 25 32.0	11.357	17	14 31 32.76	2.1254	19 28 18.8	8.398
18	12 57 17.07	1.9023	11 36 52.2	11.316	18	14 33 40.46	2.1311	19 36 40.2	8.313
19	12 59 11.32	1.9059	11 48 9.9	11.275	19	14 35 48.49	2.1367	19 44 56.4	8.226
20	13 1 5.78	1.9096	11 59 25.2	11.233	20	14 37 56.86	2.1424	19 53 7.3	8.138
21	13 3 0.47	1.9133	12 10 37.9	11.189	21	14 40 5.58	2.1483	20 1 13.0	8.050
22	13 4 55.38	1.9171	12 21 47.9	11.145	22	14 42 14.65	2.1540	20 9 13.3	7.959
23	13 6 50.52	1.9210	-12 32 55.3	-11.101	23	14 44 24.06	2.1597	-20 17 8.1	-7.868
AUGUST 22.					AUGUST 24.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	13 8 45.90	1.9249	-12 44 0.0	-11.056	0	14 46 33.81	2.1655	-20 24 57.5	-7.777
1	13 10 41.51	1.9288	12 55 2.0	11.009	1	14 48 43.92	2.1713	20 32 41.3	7.683
2	13 12 37.35	1.9328	13 6 1.1	10.962	2	14 50 54.37	2.1772	20 40 19.5	7.589
3	13 14 33.44	1.9368	13 16 57.4	10.914	3	14 53 5.18	2.1830	20 47 52.0	7.493
4	13 16 29.77	1.9410	13 27 50.8	10.865	4	14 55 16.33	2.1888	20 55 18.7	7.397
5	13 18 26.36	1.9452	13 38 41.2	10.815	5	14 57 27.84	2.1948	21 2 39.6	7.299
6	13 20 23.19	1.9493	13 49 28.6	10.764	6	14 59 39.70	2.2007	21 9 54.6	7.200
7	13 22 20.27	1.9536	14 0 12.9	10.713	7	15 1 51.92	2.2065	21 17 3.6	7.101
8	13 24 17.62	1.9579	14 10 54.1	10.661	8	15 4 4.48	2.2123	21 24 6.7	7.000
9	13 26 15.22	1.9623	14 21 32.2	10.608	9	15 6 17.40	2.2183	21 31 3.6	6.898
10	13 28 13.09	1.9667	14 32 7.0	10.553	10	15 8 30.67	2.2241	21 37 54.4	6.795
11	13 30 11.22	1.9712	14 42 38.6	10.498	11	15 10 44.29	2.2300	21 44 39.0	6.691
12	13 32 9.63	1.9758	14 53 6.7	10.441	12	15 12 58.27	2.2359	21 51 17.3	6.585
13	13 34 8.31	1.9803	15 3 31.5	10.385	13	15 15 12.60	2.2418	21 57 49.2	6.478
14	13 36 7.26	1.9848	15 13 52.9	10.328	14	15 17 27.29	2.2477	22 4 14.7	6.372
15	13 38 6.49	1.9895	15 24 10.8	10.268	15	15 19 42.32	2.2535	22 10 33.8	6.263
16	13 40 6.00	1.9943	15 34 25.1	10.208	16	15 21 57.71	2.2594	22 16 46.2	6.153
17	13 42 5.80	1.9990	15 44 35.8	10.148	17	15 24 13.45	2.2653	22 22 52.1	6.043
18	13 44 5.88	2.0038	15 54 42.9	10.087	18	15 26 29.55	2.2712	22 28 51.3	5.930
19	13 46 6.25	2.0087	16 4 46.2	10.023	19	15 28 45.99	2.2769	22 34 43.7	5.817
20	13 48 6.92	2.0136	16 14 45.7	9.960	20	15 31 2.78	2.2828	22 40 29.3	5.703
21	13 50 7.88	2.0185	16 24 41.4	9.896	21	15 33 19.93	2.2886	22 46 8.0	5.588
22	13 52 9.14	2.0235	16 34 33.2	9.831	22	15 35 37.41	2.2943	22 51 39.8	5.471
23	13 54 10.70	2.0284	16 44 21.1	9.764	23	15 37 55.25	2.3003	22 57 4.5	5.353
24	13 56 12.55	2.0335	-16 54 4.9	-9.697	24	15 40 13.44	2.3060	-23 2 22.2	-5.235



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 25.					AUGUST 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 40 13.44	2.3060	-23 2 22.2	-5.235	0	17 36 37.36	2.5174	-24 38 0.4	+1.578
1	15 42 31.97	2.3116	23 7 32.7	5.116	1	17 39 8.48	2.5198	24 36 21.0	1.738
2	15 44 50.83	2.3173	23 12 36.1	4.995	2	17 41 39.74	2.5222	24 34 31.9	1.898
3	15 47 10.04	2.3229	23 17 32.1	4.873	3	17 44 11.14	2.5243	24 32 33.3	2.057
4	15 49 29.58	2.3286	23 22 20.8	4.750	4	17 46 42.66	2.5263	24 30 25.1	2.218
5	15 51 49.47	2.3342	23 27 2.1	4.626	5	17 49 14.30	2.5283	24 28 7.2	2.378
6	15 54 9.68	2.3397	23 31 35.9	4.501	6	17 51 46.06	2.5303	24 25 39.7	2.539
7	15 56 30.23	2.3453	23 36 2.2	4.375	7	17 54 17.93	2.5320	24 23 2.5	2.701
8	15 58 51.11	2.3508	23 40 20.9	4.248	8	17 56 49.90	2.5337	24 20 15.6	2.863
9	16 1 12.32	2.3562	23 44 31.9	4.119	9	17 59 21.97	2.5353	24 17 19.0	3.023
10	16 3 33.85	2.3615	23 48 35.2	3.990	10	18 1 54.13	2.5367	24 14 12.8	3.185
11	16 5 55.70	2.3669	23 52 30.7	3.859	11	18 4 26.37	2.5380	24 10 56.8	3.348
12	16 8 17.88	2.3723	23 56 18.3	3.728	12	18 6 58.69	2.5393	24 7 31.0	3.511
13	16 10 40.37	2.3775	23 59 58.1	3.597	13	18 9 31.08	2.5404	24 3 55.5	3.672
14	16 13 3.18	2.3828	24 3 29.9	3.463	14	18 12 3.54	2.5415	24 0 10.4	3.833
15	16 15 26.30	2.3879	24 6 53.6	3.328	15	18 14 36.06	2.5423	23 56 15.5	3.997
16	16 17 49.73	2.3930	24 10 9.2	3.193	16	18 17 8.62	2.5432	23 52 10.8	4.158
17	16 20 13.46	2.3981	24 13 16.7	3.057	17	18 19 41.24	2.5439	23 47 56.5	4.320
18	16 22 37.50	2.4031	24 16 16.0	2.919	18	18 22 13.89	2.5445	23 43 32.4	4.483
19	16 25 1.83	2.4080	24 19 7.0	2.781	19	18 24 46.58	2.5451	23 38 58.5	4.645
20	16 27 26.46	2.4128	24 21 49.7	2.642	20	18 27 19.30	2.5454	23 34 15.0	4.806
21	16 29 51.37	2.4176	24 24 24.0	2.502	21	18 29 52.03	2.5458	23 29 21.8	4.968
22	16 32 16.57	2.4224	24 26 49.9	2.361	22	18 32 24.79	2.5460	23 24 18.9	5.129
23	16 34 42.06	2.4271	-24 29 7.3	-2.218	23	18 34 57.55	2.5460	-23 19 6.3	+5.291
AUGUST 26.					AUGUST 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	16 37 7.82	2.4317	-24 31 16.0	-2.074	0	18 37 30.31	2.5460	-23 13 44.0	+5.452
1	16 39 33.86	2.4363	24 33 16.2	1.932	1	18 40 3.07	2.5459	23 8 12.1	5.613
2	16 42 0.17	2.4407	24 35 7.8	1.787	2	18 42 35.82	2.5458	23 2 30.5	5.773
3	16 44 26.74	2.4451	24 36 50.6	1.642	3	18 45 8.56	2.5455	22 56 39.3	5.933
4	16 46 53.58	2.4494	24 38 24.8	1.496	4	18 47 41.28	2.5451	22 50 38.5	6.093
5	16 49 20.67	2.4537	24 39 50.1	1.348	5	18 50 13.97	2.5446	22 44 28.2	6.252
6	16 51 48.02	2.4578	24 41 6.5	1.200	6	18 52 46.63	2.5440	22 38 8.3	6.412
7	16 54 15.61	2.4618	24 42 14.1	1.052	7	18 55 19.25	2.5433	22 31 38.8	6.570
8	16 56 43.44	2.4658	24 43 12.7	0.902	8	18 57 51.83	2.5426	22 24 59.9	6.727
9	16 59 11.51	2.4698	24 44 2.3	0.752	9	19 0 24.36	2.5417	22 18 11.6	6.884
10	17 1 39.81	2.4736	24 44 42.9	0.601	10	19 2 56.83	2.5408	22 11 13.8	7.042
11	17 4 8.34	2.4773	24 45 14.4	0.449	11	19 5 29.25	2.5398	22 4 6.6	7.198
12	17 6 37.09	2.4810	24 45 36.8	0.297	12	19 8 1.60	2.5387	21 56 50.1	7.353
13	17 9 6.06	2.4846	24 45 50.0	-0.144	13	19 10 33.89	2.5375	21 49 24.3	7.508
14	17 11 35.24	2.4880	24 45 54.1	+0.010	14	19 13 6.10	2.5362	21 41 49.1	7.663
15	17 14 4.62	2.4913	24 45 48.8	0.164	15	19 15 38.23	2.5348	21 34 4.8	7.816
16	17 16 34.20	2.4946	24 45 34.4	0.319	16	19 18 10.27	2.5333	21 26 11.2	7.969
17	17 19 3.97	2.4978	24 45 10.5	0.475	17	19 20 42.23	2.5319	21 18 8.5	8.121
18	17 21 33.94	2.5010	24 44 37.4	0.630	18	19 23 14.10	2.5303	21 9 56.7	8.272
19	17 24 4.09	2.5039	24 43 54.9	0.788	19	19 25 45.87	2.5286	21 1 35.9	8.423
20	17 26 34.41	2.5068	24 43 2.9	0.945	20	19 28 17.53	2.5268	20 53 6.0	8.573
21	17 29 4.91	2.5097	24 42 1.5	1.103	21	19 30 49.09	2.5250	20 44 27.2	8.721
22	17 31 35.57	2.5123	24 40 50.6	1.260	22	19 33 20.53	2.5232	20 35 39.5	8.869
23	17 34 6.39	2.5149	24 39 30.3	1.418	23	19 35 51.87	2.5212	20 26 42.9	9.016
24	17 36 37.36	2.5174	-24 38 0.4	+1.578	24	19 38 23.07	2.5191	-20 17 37.6	+9.16"

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
AUGUST 29.					AUGUST 31.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	19 38 23.07	2.5191	-20 17 37.6	+ 9.162	0	21 36 14.27	2.3856	-10 33 55.2	+14.571
1	19 40 54.16	2.5171	20 8 23.5	9.307	1	21 38 37.32	2.3828	10 19 18.8	14.643
2	19 43 25.12	2.5150	19 59 0.8	9.451	2	21 41 0.21	2.3802	10 4 38.1	14.713
3	19 45 55.96	2.5128	19 49 29.4	9.593	3	21 43 22.94	2.3774	9 49 53.2	14.781
4	19 48 26.66	2.5105	19 39 49.6	9.735	4	21 45 45.50	2.3747	9 35 4.4	14.847
5	19 50 57.22	2.5082	19 30 1.2	9.877	5	21 48 7.90	2.3720	9 20 11.6	14.912
6	19 53 27.64	2.5058	19 20 4.4	10.016	6	21 50 30.14	2.3694	9 5 15.0	14.973
7	19 55 57.92	2.5034	19 9 59.3	10.153	7	21 52 52.23	2.3668	8 50 14.8	15.033
8	19 58 28.05	2.5010	18 59 46.0	10.291	8	21 55 14.16	2.3643	8 35 11.0	15.093
9	20 0 58.04	2.4985	18 49 24.4	10.428	9	21 57 35.94	2.3618	8 20 3.7	15.149
10	20 3 27.87	2.4959	18 38 54.6	10.563	10	21 59 57.58	2.3593	8 4 53.1	15.203
11	20 5 57.55	2.4933	18 28 16.9	10.696	11	22 2 19.06	2.3568	7 49 39.3	15.256
12	20 8 27.07	2.4907	18 17 31.1	10.828	12	22 4 40.40	2.3545	7 34 22.4	15.307
13	20 10 56.43	2.4880	18 6 37.5	10.959	13	22 7 1.60	2.3521	7 19 2.5	15.355
14	20 13 25.63	2.4853	17 55 36.0	11.089	14	22 9 22.65	2.3498	7 3 39.8	15.402
15	20 15 54.67	2.4826	17 44 26.8	11.218	15	22 11 43.57	2.3475	6 48 14.3	15.447
16	20 18 23.54	2.4798	17 33 9.9	11.344	16	22 14 4.35	2.3453	6 32 46.2	15.489
17	20 20 52.24	2.4770	17 21 45.5	11.470	17	22 16 25.00	2.3431	6 17 15.6	15.530
18	20 23 20.78	2.4742	17 10 13.5	11.594	18	22 18 45.52	2.3409	6 1 42.6	15.568
19	20 25 49.14	2.4713	16 58 34.2	11.717	19	22 21 5.91	2.3388	5 46 7.4	15.605
20	20 28 17.33	2.4684	16 46 47.5	11.838	20	22 23 26.18	2.3368	5 30 30.0	15.641
21	20 30 45.35	2.4655	16 34 53.6	11.958	21	22 25 46.32	2.3348	5 14 50.5	15.673
22	20 33 13.19	2.4626	16 22 52.6	12.076	22	22 28 6.35	2.3328	4 59 9.2	15.703
23	20 35 40.86	2.4597	-16 10 44.5	+12.193	23	22 30 26.26	2.3308	- 4 43 26.1	+15.733
AUGUST 30.					SEPTEMBER 1.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 38 8.35	2.4567	-15 58 29.4	+12.308	0	22 32 46.05	2.3289	- 4 27 41.3	+15.760
1	20 40 35.66	2.4537	15 46 7.5	12.422	1	22 35 5.73	2.3272	4 11 54.9	15.785
2	20 43 2.79	2.4507	15 33 38.8	12.534	2	22 37 25.31	2.3254	3 56 7.1	15.808
3	20 45 29.74	2.4478	15 21 3.4	12.645	3	22 39 44.78	2.3238	3 40 18.0	15.828
4	20 47 56.52	2.4448	15 8 21.4	12.753	4	22 42 4.16	2.3221	3 24 27.7	15.848
5	20 50 23.11	2.4417	14 55 33.0	12.861	5	22 44 23.43	2.3203	3 8 36.3	15.864
6	20 52 49.52	2.4387	14 42 38.1	12.967	6	22 46 42.60	2.3188	2 52 44.0	15.879
7	20 55 15.75	2.4356	14 29 37.0	13.070	7	22 49 1.69	2.3173	2 36 50.8	15.893
8	20 57 41.79	2.4326	14 16 29.7	13.173	8	22 51 20.68	2.3158	2 20 56.8	15.904
9	21 0 7.66	2.4297	14 3 16.2	13.274	9	22 53 39.59	2.3145	2 5 2.3	15.913
10	21 2 33.35	2.4267	13 49 56.8	13.373	10	22 55 58.42	2.3131	1 49 7.3	15.919
11	21 4 58.86	2.4236	13 36 31.5	13.470	11	22 58 17.16	2.3117	1 33 12.0	15.924
12	21 7 24.18	2.4205	13 23 0.4	13.566	12	23 0 35.82	2.3105	1 17 16.4	15.928
13	21 9 49.32	2.4176	13 9 23.6	13.659	13	23 2 54.42	2.3093	1 1 20.6	15.930
14	21 12 14.29	2.4147	12 55 41.3	13.751	14	23 5 12.94	2.3082	0 45 24.8	15.929
15	21 14 39.08	2.4117	12 41 53.5	13.842	15	23 7 31.40	2.3071	0 29 29.1	15.927
16	21 17 3.69	2.4087	12 28 0.3	13.930	16	23 9 49.79	2.3061	- 0 13 33.6	15.922
17	21 19 28.12	2.4057	12 14 1.9	14.016	17	23 12 8.13	2.3051	+ 0 2 21.5	15.916
18	21 21 52.37	2.4028	11 59 58.4	14.101	18	23 14 26.40	2.3042	0 18 16.3	15.908
19	21 24 16.45	2.3999	11 45 49.8	14.185	19	23 16 44.63	2.3033	0 34 10.4	15.897
20	21 26 40.36	2.3970	11 31 36.2	14.266	20	23 19 2.80	2.3024	0 50 3.9	15.885
21	21 29 4.09	2.3941	11 17 17.9	14.344	21	23 21 20.92	2.3017	1 5 56.6	15.871
22	21 31 27.65	2.3913	11 2 54.9	14.422	22	23 23 39.00	2.3010	1 21 48.4	15.855
23	21 33 51.05	2.3885	10 48 27.3	14.498	23	23 25 57.04	2.3003	1 37 39.2	15.837
24	21 36 14.27	2.3856	-10 33 55.2	+14.571	24	23 28 15.03	2.2996	+ 1 53 28.8	+15.817

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 2.					SEPTEMBER 4.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 28 15.03	2.2996	+ 1 53 28.8	+15.817	0	1 18 50.72	2.3238	+13 36 41.9	+12.867
1	23 30 32.99	2.2992	2 9 17.2	15.796	1	1 21 10.18	2.3251	13 49 31.0	12.769
2	23 32 50.93	2.2987	2 25 4.3	15.773	2	1 23 29.73	2.3264	14 2 14.2	12.669
3	23 35 8.83	2.2982	2 40 49.9	15.747	3	1 25 49.35	2.3277	14 14 51.3	12.569
4	23 37 26.71	2.2978	2 56 33.9	15.719	4	1 28 9.05	2.3290	14 27 22.5	12.468
5	23 39 44.57	2.2974	3 12 16.2	15.691	5	1 30 28.83	2.3303	14 39 47.4	12.364
6	23 42 2.40	2.2971	3 27 56.8	15.660	6	1 32 48.69	2.3318	14 52 6.2	12.261
7	23 44 20.22	2.2969	3 43 35.4	15.627	7	1 35 8.64	2.3331	15 4 18.7	12.156
8	23 46 38.03	2.2968	3 59 12.0	15.593	8	1 37 28.66	2.3344	15 16 24.9	12.049
9	23 48 55.83	2.2966	4 14 46.6	15.558	9	1 39 48.77	2.3359	15 28 24.6	11.942
10	23 51 13.62	2.2964	4 30 18.9	15.518	10	1 42 8.97	2.3373	15 40 17.9	11.833
11	23 53 31.40	2.2963	4 45 48.8	15.478	11	1 44 29.24	2.3386	15 52 4.6	11.724
12	23 55 49.18	2.2964	5 1 16.3	15.438	12	1 46 49.60	2.3400	16 3 44.8	11.614
13	23 58 6.97	2.2965	5 16 41.3	15.394	13	1 49 10.04	2.3414	16 15 18.3	11.502
14	0 0 24.76	2.2966	5 32 3.6	15.349	14	1 51 30.57	2.3428	16 26 45.0	11.388
15	0 2 42.56	2.2968	5 47 23.2	15.303	15	1 53 51.18	2.3442	16 38 4.9	11.274
16	0 5 0.37	2.2969	6 2 39.9	15.253	16	1 56 11.87	2.3455	16 49 17.9	11.159
17	0 7 18.19	2.2972	6 17 53.6	15.203	17	1 58 32.64	2.3469	17 0 24.0	11.044
18	0 9 36.03	2.2975	6 33 4.3	15.152	18	2 0 53.50	2.3483	17 11 23.2	10.927
19	0 11 53.89	2.2978	6 48 11.8	15.098	19	2 3 14.44	2.3497	17 22 15.2	10.808
20	0 14 11.77	2.2982	7 3 16.0	15.043	20	2 5 35.46	2.3510	17 33 0.2	10.691
21	0 16 29.67	2.2987	7 18 16.9	14.986	21	2 7 56.56	2.3523	17 43 38.1	10.571
22	0 18 47.61	2.2992	7 33 14.3	14.928	22	2 10 17.74	2.3537	17 54 8.7	10.450
23	0 21 5.57	2.2996	+ 7 48 8.2	+14.867	23	2 12 39.00	2.3550	+18 4 32.1	+10.329
SEPTEMBER 3.					SEPTEMBER 5.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	0 23 23.56	2.3002	+ 8 <sub>3</sub> 2 58.3	+14.804	0	2 15 0.34	2.3563	+18 14 48.2	+10.207
1	0 25 41.59	2.3008	8 17 44.7	14.742	1	2 17 21.76	2.3576	18 24 56.9	10.083
2	0 27 59.65	2.3014	8 32 27.3	14.676	2	2 19 43.25	2.3588	18 34 58.2	9.960
3	0 30 17.76	2.3021	8 47 5.8	14.609	3	2 22 4.82	2.3601	18 44 52.1	9.835
4	0 32 35.90	2.3028	9 1 40.4	14.542	4	2 24 26.46	2.3613	18 54 38.4	9.709
5	0 34 54.09	2.3036	9 16 10.8	14.471	5	2 26 48.18	2.3625	19 4 17.2	9.583
6	0 37 12.33	2.3044	9 30 36.9	14.399	6	2 29 9.96	2.3637	19 13 48.4	9.456
7	0 39 30.62	2.3052	9 44 58.7	14.327	7	2 31 31.82	2.3649	19 23 11.9	9.328
8	0 41 48.95	2.3060	9 59 16.1	14.253	8	2 33 53.75	2.3660	19 32 27.7	9.199
9	0 44 7.34	2.3069	10 13 29.0	14.177	9	2 36 15.74	2.3671	19 41 35.8	9.071
10	0 46 25.78	2.3078	10 27 37.3	14.099	10	2 38 37.80	2.3682	19 50 36.2	8.941
11	0 48 44.28	2.3088	10 41 40.9	14.020	11	2 40 59.92	2.3692	19 59 28.7	8.810
12	0 51 2.84	2.3098	10 55 39.7	13.939	12	2 43 22.10	2.3702	20 8 13.4	8.679
13	0 53 21.46	2.3108	11 9 33.6	13.858	13	2 45 44.34	2.3712	20 16 50.2	8.548
14	0 55 40.14	2.3119	11 23 22.6	13.775	14	2 48 6.64	2.3721	20 25 19.1	8.415
15	0 57 58.89	2.3130	11 37 6.6	13.690	15	2 50 28.99	2.3730	20 33 40.0	8.282
16	1 0 17.70	2.3140	11 50 45.4	13.603	16	2 52 51.40	2.3738	20 41 52.9	8.148
17	1 2 36.57	2.3152	12 4 19.0	13.517	17	2 55 13.85	2.3747	20 49 57.7	8.013
18	1 4 55.52	2.3164	12 17 47.4	13.428	18	2 57 36.36	2.3755	20 57 54.5	7.880
19	1 7 14.54	2.3176	12 31 10.4	13.338	19	2 59 58.91	2.3762	21 5 43.3	7.745
20	1 9 33.63	2.3188	12 44 27.9	13.246	20	3 2 21.50	2.3768	21 13 23.9	7.608
21	1 11 52.79	2.3199	12 57 39.9	13.153	21	3 4 44.13	2.3776	21 20 56.3	7.473
22	1 14 12.02	2.3212	13 10 46.3	13.059	22	3 7 6.81	2.3783	21 28 20.6	7.336
23	1 16 31.33	2.3225	13 23 47.0	12.963	23	3 9 29.52	2.3788	21 35 36.6	7.199
24	1 18 50.72	2.3238	+13 36 41.9	+12.867	24	3 11 52.26	2.3793	+21 42 44.5	+7.063



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 6.					SEPTEMBER 8.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	3 11 52.26	2.3793	+21 42 44.5	+7.063	0	5 5 34.71	2.3340	+24 40 5.1	+0.344
1	3 14 15.03	2.3798	21 49 44.1	6.924	1	5 7 54.67	2.3314	24 40 21.7	0.209
2	3 16 37.83	2.3802	21 56 35.4	6.786	2	5 10 14.48	2.3289	24 40 30.2	+0.075
3	3 19 0.65	2.3806	22 3 18.4	6.647	3	5 12 34.14	2.3263	24 40 30.7	-0.060
4	3 21 23.50	2.3809	22 9 53.0	6.508	4	5 14 53.63	2.3235	24 40 23.0	0.194
5	3 23 46.36	2.3812	22 16 19.4	6.370	5	5 17 12.96	2.3208	24 40 7.4	0.328
6	3 26 9.24	2.3813	22 22 37.4	6.230	6	5 19 32.12	2.3178	24 39 43.7	0.461
7	3 28 32.12	2.3815	22 28 47.0	6.090	7	5 21 51.10	2.3150	24 39 12.1	0.593
8	3 30 55.02	2.3817	22 34 48.2	5.950	8	5 24 9.92	2.3121	24 38 32.6	0.724
9	3 33 17.92	2.3817	22 40 41.0	5.809	9	5 26 28.55	2.3090	24 37 45.2	0.857
10	3 35 40.82	2.3816	22 46 25.3	5.669	10	5 28 47.00	2.3060	24 36 49.8	0.988
11	3 38 3.71	2.3816	22 52 1.3	5.529	11	5 31 5.27	2.3029	24 35 46.7	1.118
12	3 40 26.61	2.3815	22 57 28.8	5.388	12	5 33 23.35	2.2998	24 34 35.7	1.248
13	3 42 49.49	2.3813	23 2 47.8	5.247	13	5 35 41.24	2.2965	24 33 17.0	1.377
14	3 45 12.36	2.3811	23 7 58.4	5.106	14	5 37 58.93	2.2932	24 31 50.5	1.506
15	3 47 35.22	2.3808	23 13 0.5	4.964	15	5 40 16.42	2.2898	24 30 16.3	1.633
16	3 49 58.05	2.3803	23 17 54.1	4.823	16	5 42 33.71	2.2864	24 28 34.5	1.761
17	3 52 20.86	2.3799	23 22 39.3	4.682	17	5 44 50.79	2.2830	24 26 45.0	1.888
18	3 54 43.64	2.3794	23 27 15.9	4.540	18	5 47 7.67	2.2796	24 24 48.0	2.013
19	3 57 6.39	2.3789	23 31 44.1	4.398	19	5 49 24.34	2.2761	24 22 43.4	2.139
20	3 59 29.11	2.3783	23 36 3.7	4.257	20	5 51 40.80	2.2725	24 20 31.3	2.264
21	4 1 51.78	2.3776	23 40 14.9	4.115	21	5 53 57.04	2.2688	24 18 11.7	2.389
22	4 4 14.42	2.3768	23 44 17.5	3.973	22	5 56 13.06	2.2653	24 15 44.6	2.513
23	4 6 37.00	2.3759	+23 48 11.6	+3.832	23	5 58 28.87	2.2616	+24 13 10.2	-2.635
SEPTEMBER 7.					SEPTEMBER 9.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	4 8 59.53	2.3751	+23 51 57.3	+3.691	0	6 0 44.45	2.2578	+24 10 28.4	-2.758
1	4 11 22.01	2.3742	23 55 34.5	3.548	1	6 2 59.81	2.2540	24 7 39.3	2.879
2	4 13 44.43	2.3732	23 59 3.1	3.407	2	6 5 14.93	2.2502	24 4 42.9	3.000
3	4 16 6.79	2.3721	24 2 23.3	3.266	3	6 7 29.83	2.2463	24 1 39.3	3.121
4	4 18 29.08	2.3709	24 5 35.0	3.124	4	6 9 44.49	2.2424	23 58 28.4	3.240
5	4 20 51.30	2.3698	24 8 38.2	2.983	5	6 11 58.92	2.2385	23 55 10.5	3.358
6	4 23 13.45	2.3685	24 11 32.9	2.842	6	6 14 13.11	2.2345	23 51 45.4	3.477
7	4 25 35.52	2.3671	24 14 19.2	2.702	7	6 16 27.06	2.2305	23 48 13.3	3.594
8	4 27 57.50	2.3657	24 16 57.1	2.561	8	6 18 40.77	2.2265	23 44 34.1	3.711
9	4 30 19.40	2.3642	24 19 26.5	2.419	9	6 20 54.24	2.2224	23 40 48.0	3.827
10	4 32 41.20	2.3626	24 21 47.4	2.279	10	6 23 7.46	2.2183	23 36 54.9	3.942
11	4 35 2.91	2.3611	24 24 0.0	2.139	11	6 25 20.44	2.2143	23 32 55.0	4.056
12	4 37 24.53	2.3594	24 26 4.1	1.999	12	6 27 33.17	2.2101	23 28 48.2	4.170
13	4 39 46.04	2.3576	24 27 59.9	1.860	13	6 29 45.65	2.2059	23 24 34.6	4.283
14	4 42 7.44	2.3558	24 29 47.3	1.720	14	6 31 57.88	2.2017	23 20 14.3	4.395
15	4 44 28.73	2.3539	24 31 26.3	1.582	15	6 34 9.85	2.1974	23 15 47.2	4.506
16	4 46 49.91	2.3519	24 32 57.1	1.443	16	6 36 21.57	2.1933	23 11 13.6	4.617
17	4 49 10.96	2.3499	24 34 19.5	1.304	17	6 38 33.04	2.1889	23 6 33.2	4.727
18	4 51 31.90	2.3478	24 35 33.6	1.166	18	6 40 44.24	2.1847	23 1 46.4	4.835
19	4 53 52.70	2.3457	24 36 39.4	1.028	19	6 42 55.20	2.1804	22 56 53.0	4.943
20	4 56 13.38	2.3435	24 37 37.0	0.891	20	6 45 5.89	2.1760	22 51 53.2	5.051
21	4 58 33.92	2.3413	24 38 26.3	0.753	21	6 47 16.32	2.1717	22 46 46.9	5.158
22	5 0 54.33	2.3389	24 39 7.4	0.618	22	6 49 26.49	2.1673	22 41 34.3	5.263
23	5 3 14.59	2.3365	24 39 40.4	0.481	23	6 51 36.40	2.1630	22 36 15.3	5.368
24	5 5 34.71	2.3340	+24 40 5.1	+0.344	24	6 53 46.05	2.1586	+22 30 50.1	-5.472

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 10.							SEPTEMBER 12.						
	h	m	s	s	°	'		h	m	s	s	°	'
0	6	53	46.05	2.1586	+22	30 50.1	0	8	32	22.22	1.9553	+16	23 39.6
1	6	55	55.43	2.1542	22	25 18.7	1	8	34	19.43	1.9517	16	14 6.9
2	6	58	4.55	2.1498	22	19 41.0	2	8	36	16.42	1.9480	16	4 30.3
3	7	0	13.41	2.1454	22	13 57.3	3	8	38	13.19	1.9443	15	54 50.0
4	7	2	22.00	2.1410	22	8 7.5	4	8	40	9.74	1.9407	15	45 5.9
5	7	4	30.33	2.1366	22	2 11.6	5	8	42	6.07	1.9371	15	35 18.1
6	7	6	38.39	2.1321	21	56 9.7	6	8	44	2.19	1.9337	15	25 26.6
7	7	8	46.18	2.1277	21	50 2.0	7	8	45	58.11	1.9302	15	15 31.5
8	7	10	53.71	2.1233	21	43 48.3	8	8	47	53.81	1.9267	15	5 32.9
9	7	13	0.97	2.1188	21	37 28.8	9	8	49	49.31	1.9233	14	55 30.7
10	7	15	7.97	2.1144	21	31 3.5	10	8	51	44.61	1.9199	14	45 25.1
11	7	17	14.70	2.1100	21	24 32.4	11	8	53	39.70	1.9165	14	35 16.1
12	7	19	21.17	2.1056	21	17 55.7	12	8	55	34.59	1.9133	14	25 3.6
13	7	21	27.37	2.1012	21	11 13.3	13	8	57	29.29	1.9100	14	14 47.9
14	7	23	33.31	2.0967	21	4 25.4	14	8	59	23.79	1.9068	14	4 28.8
15	7	25	38.97	2.0923	20	57 31.9	15	9	1	18.10	1.9036	13	54 6.5
16	7	27	44.38	2.0878	20	50 32.9	16	9	3	12.22	1.9004	13	43 41.0
17	7	29	49.51	2.0834	20	43 28.5	17	9	5	6.15	1.8973	13	33 12.4
18	7	31	54.39	2.0791	20	36 18.7	18	9	6	59.90	1.8943	13	22 40.7
19	7	33	59.00	2.0746	20	29 3.5	19	9	8	53.47	1.8913	13	12 5.9
20	7	36	3.34	2.0703	20	21 43.0	20	9	10	46.86	1.8883	13	1 28.1
21	7	38	7.43	2.0659	20	14 17.3	21	9	12	40.07	1.8853	12	50 47.3
22	7	40	11.25	2.0615	20	6 46.4	22	9	14	33.10	1.8825	12	40 3.6
23	7	42	14.81	2.0571	+19	59 10.3	23	9	16	25.97	1.8797	+12	29 17.0
SEPTEMBER 11.							SEPTEMBER 13.						
0	7	44	18.10	2.0528	+19	51 29.1	0	9	18	18.66	1.8768	+12	18 27.6
1	7	46	21.14	2.0485	19	43 42.9	1	9	20	11.19	1.8742	12	7 35.4
2	7	48	23.92	2.0442	19	35 51.7	2	9	22	3.56	1.8714	11	56 40.4
3	7	50	26.44	2.0399	19	27 55.6	3	9	23	55.76	1.8688	11	45 42.7
4	7	52	28.71	2.0357	19	19 54.5	4	9	25	47.81	1.8662	11	34 42.4
5	7	54	30.72	2.0314	19	11 48.6	5	9	27	39.70	1.8636	11	23 39.4
6	7	56	32.48	2.0272	19	3 37.9	6	9	29	31.44	1.8611	11	12 33.9
7	7	58	33.98	2.0230	18	55 22.5	7	9	31	23.03	1.8587	11	1 25.9
8	8	0	35.24	2.0188	18	47 2.3	8	9	33	14.48	1.8563	10	50 15.3
9	8	2	36.24	2.0146	18	38 37.5	9	9	35	5.78	1.8538	10	39 2.3
10	8	4	36.99	2.0104	18	30 8.0	10	9	36	56.93	1.8514	10	27 47.0
11	8	6	37.49	2.0063	18	21 34.1	11	9	38	47.95	1.8492	10	16 29.2
12	8	8	37.75	2.0023	18	12 55.6	12	9	40	38.83	1.8469	10	5 9.2
13	8	10	37.76	1.9982	18	4 12.7	13	9	42	29.58	1.8448	9	53 46.9
14	8	12	37.53	1.9942	17	55 25.3	14	9	44	20.20	1.8427	9	42 22.4
15	8	14	37.06	1.9902	17	46 33.6	15	9	46	10.70	1.8406	9	30 55.7
16	8	16	36.35	1.9862	17	37 37.5	16	9	48	1.07	1.8385	9	19 26.8
17	8	18	35.40	1.9822	17	28 37.2	17	9	49	51.32	1.8365	9	7 55.9
18	8	20	34.21	1.9783	17	19 32.7	18	9	51	41.45	1.8345	8	56 22.9
19	8	22	32.79	1.9744	17	10 24.0	19	9	53	31.46	1.8326	8	44 47.9
20	8	24	31.14	1.9705	17	1 11.2	20	9	55	21.36	1.8308	8	33 10.9
21	8	26	29.25	1.9667	16	51 54.3	21	9	57	11.16	1.8291	8	21 32.0
22	8	28	27.14	1.9628	16	42 33.4	22	9	59	0.85	1.8273	8	9 51.2
23	8	30	24.79	1.9590	16	33 8.5	23	10	0	50.43	1.8255	7	58 8.6
24	8	32	22.22	1.9553	+16	23 39.6	24	10	2	39.91	1.8239	+ 7	46 24.1

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 14.					SEPTEMBER 16.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 2 39.91	1.8239	+7 46 24.1	-11.756	0	11 29 18.52	1.8066	-1 58 39.3	-12.353
1	10 4 29.30	1.8223	7 34 37.9	11.784	1	11 31 6.95	1.8076	2 11 0.3	12.347
2	10 6 18.59	1.8208	7 22 50.0	11.812	2	11 32 55.43	1.8086	2 23 20.9	12.341
3	10 8 7.80	1.8193	7 11 0.5	11.840	3	11 34 43.98	1.8097	2 35 41.2	12.335
4	10 9 56.91	1.8178	6 59 9.2	11.868	4	11 36 32.59	1.8108	2 48 1.1	12.328
5	10 11 45.94	1.8165	6 47 16.4	11.893	5	11 38 21.27	1.8119	3 0 20.5	12.319
6	10 13 34.89	1.8152	6 35 22.1	11.918	6	11 40 10.02	1.8132	3 12 39.4	12.311
7	10 15 23.76	1.8138	6 23 26.3	11.943	7	11 41 58.85	1.8144	3 24 57.8	12.302
8	10 17 12.55	1.8127	6 11 28.9	11.968	8	11 43 47.75	1.8158	3 37 15.6	12.292
9	10 19 1.28	1.8115	5 59 30.2	11.990	9	11 45 36.74	1.8172	3 49 32.8	12.281
10	10 20 49.93	1.8103	5 47 30.1	12.013	10	11 47 25.81	1.8186	4 1 49.3	12.269
11	10 22 38.51	1.8092	5 35 28.6	12.035	11	11 49 14.97	1.8200	4 14 5.1	12.257
12	10 24 27.03	1.8082	5 23 25.9	12.066	12	11 51 4.21	1.8215	4 26 20.1	12.243
13	10 26 15.49	1.8073	5 11 21.9	12.077	13	11 52 53.55	1.8233	4 38 34.3	12.230
14	10 28 3.90	1.8063	4 59 16.7	12.096	14	11 54 43.00	1.8249	4 50 47.7	12.216
15	10 29 52.25	1.8054	4 47 10.4	12.115	15	11 56 32.54	1.8265	5 3 0.2	12.200
16	10 31 40.55	1.8046	4 35 2.9	12.134	16	11 58 22.18	1.8283	5 15 11.7	12.184
17	10 33 28.80	1.8038	4 22 54.3	12.152	17	12 0 11.94	1.8302	5 27 22.3	12.168
18	10 35 17.01	1.8031	4 10 44.7	12.169	18	12 2 1.80	1.8320	5 39 31.8	12.149
19	10 37 5.17	1.8024	3 58 34.0	12.185	19	12 3 51.78	1.8339	5 51 40.2	12.132
20	10 38 53.30	1.8019	3 46 22.5	12.200	20	12 5 41.87	1.8358	6 3 47.6	12.113
21	10 40 41.40	1.8013	3 34 10.0	12.216	21	12 7 32.08	1.8379	6 15 53.7	12.092
22	10 42 29.46	1.8008	3 21 56.6	12.230	22	12 9 22.42	1.8400	6 27 58.6	12.072
23	10 44 17.50	1.8003	+3 9 42.4	-12.243	23	12 11 12.88	1.8421	-6 40 2.3	-12.050
SEPTEMBER 15.					SEPTEMBER 17.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	10 46 5.50	1.7999	+2 57 27.4	-12.256	0	12 13 3.47	1.8443	-6 52 4.6	-12.028
1	10 47 53.49	1.7996	2 45 11.7	12.268	1	12 14 54.20	1.8466	7 4 5.6	12.005
2	10 49 41.45	1.7993	2 32 55.3	12.279	2	12 16 45.06	1.8488	7 16 5.2	11.981
3	10 51 29.40	1.7991	2 20 38.2	12.291	3	12 18 36.06	1.8512	7 28 3.3	11.956
4	10 53 17.34	1.7989	2 8 20.4	12.301	4	12 20 27.20	1.8535	7 39 59.9	11.931
5	10 55 5.27	1.7988	1 56 2.1	12.309	5	12 22 18.48	1.8560	7 51 55.0	11.905
6	10 56 53.20	1.7988	1 43 43.3	12.318	6	12 24 9.92	1.8585	8 3 48.5	11.878
7	10 58 41.12	1.7988	1 31 24.0	12.326	7	12 26 1.50	1.8610	8 15 40.3	11.850
8	11 0 29.05	1.7988	1 19 4.2	12.333	8	12 27 53.24	1.8637	8 27 30.5	11.822
9	11 2 16.97	1.7988	1 6 44.0	12.340	9	12 29 45.14	1.8663	8 39 18.9	11.792
10	11 4 4.91	1.7990	0 54 23.4	12.346	10	12 31 37.20	1.8689	8 51 5.5	11.761
11	11 5 52.85	1.7992	0 42 2.5	12.350	11	12 33 29.41	1.8717	9 2 50.2	11.730
12	11 7 40.81	1.7994	0 29 41.4	12.354	12	12 35 21.80	1.8746	9 14 33.1	11.699
13	11 9 28.78	1.7998	0 17 20.0	12.358	13	12 37 14.36	1.8774	9 26 14.1	11.667
14	11 11 16.78	1.8002	+0 4 58.4	12.362	14	12 39 7.09	1.8803	9 37 53.1	11.633
15	11 13 4.80	1.8005	-0 7 23.4	12.364	15	12 40 59.99	1.8833	9 49 30.0	11.598
16	11 14 52.84	1.8009	0 19 45.3	12.366	16	12 42 53.08	1.8863	10 1 4.9	11.563
17	11 16 40.91	1.8015	0 32 7.3	12.367	17	12 44 46.34	1.8893	10 12 37.6	11.528
18	11 18 29.02	1.8021	0 44 29.3	12.366	18	12 46 39.79	1.8924	10 24 8.2	11.491
19	11 20 17.16	1.8027	0 56 51.2	12.365	19	12 48 33.43	1.8956	10 35 36.5	11.453
20	11 22 5.34	1.8034	1 9 13.1	12.364	20	12 50 27.26	1.8988	10 47 2.5	11.415
21	11 23 53.57	1.8042	1 21 34.9	12.363	21	12 52 21.29	1.9021	10 58 26.3	11.376
22	11 25 41.84	1.8049	1 33 56.6	12.369	22	12 54 15.51	1.9053	11 9 47.6	11.335
23	11 27 30.16	1.8057	1 46 18.0	12.366	23	12 56 9.92	1.9086	11 21 6.5	11.293
24	11 29 18.52	1.8066	-1 58 39.3	-12.363	24	12 58 4.54	1.9121	-11 32 22.8	-11.252

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.		
SEPTEMBER 18.							SEPTEMBER 20.								
	h	m	s	s	°	'		h	m	s	s	°	'	'	
0	12	58	4.54	1.9121	-11	32 22.8	-11.252	0	14	34	32.85	2.1205	-19	27 11.0	-8.171
1	12	59	59.37	1.9155	11	43 36.7	11.209	1	14	36	40.23	2.1255	19	35 18.6	8.063
2	13	1	54.40	1.9189	11	54 47.9	11.165	2	14	38	47.91	2.1306	19	43 21.0	7.995
3	13	3	49.64	1.9225	12	5 56.5	11.122	3	14	40	55.90	2.1356	19	51 18.0	7.905
4	13	5	45.10	1.9261	12	17 2.5	11.077	4	14	43	4.18	2.1406	19	59 9.6	7.814
5	13	7	40.77	1.9298	12	28 5.7	11.030	5	14	45	12.77	2.1457	20	6 55.7	7.723
6	13	9	36.67	1.9334	12	39 6.1	10.983	6	14	47	21.66	2.1508	20	14 36.3	7.629
7	13	11	32.78	1.9371	12	50 3.6	10.935	7	14	49	30.86	2.1558	20	22 11.2	7.536
8	13	13	29.12	1.9408	13	0 58.3	10.886	8	14	51	40.35	2.1608	20	29 40.6	7.442
9	13	15	25.68	1.9447	13	11 49.9	10.836	9	14	53	50.15	2.1659	20	37 4.2	7.345
10	13	17	22.48	1.9485	13	22 38.6	10.786	10	14	56	0.26	2.1709	20	44 22.0	7.248
11	13	19	19.50	1.9523	13	33 24.2	10.734	11	14	58	10.66	2.1759	20	51 34.0	7.152
12	13	21	16.76	1.9563	13	44 6.7	10.682	12	15	0	21.37	2.1810	20	58 40.2	7.053
13	13	23	14.26	1.9603	13	54 46.0	10.628	13	15	2	32.38	2.1861	21	5 40.4	6.953
14	13	25	11.99	1.9643	14	5 22.1	10.575	14	15	4	43.70	2.1912	21	12 34.6	6.853
15	13	27	9.97	1.9683	14	15 55.0	10.520	15	15	6	55.32	2.1962	21	19 22.7	6.751
16	13	29	8.19	1.9724	14	26 24.5	10.463	16	15	9	7.24	2.2012	21	26 4.7	6.648
17	13	31	6.66	1.9766	14	36 50.6	10.406	17	15	11	19.46	2.2062	21	32 40.5	6.545
18	13	33	5.38	1.9808	14	47 13.2	10.348	18	15	13	31.98	2.2112	21	39 10.1	6.441
19	13	35	4.35	1.9849	14	57 32.4	10.290	19	15	15	44.80	2.2163	21	45 33.4	6.335
20	13	37	3.57	1.9892	15	7 48.0	10.230	20	15	17	57.93	2.2213	21	51 50.3	6.228
21	13	39	3.05	1.9935	15	18 0.0	10.169	21	15	20	11.35	2.2262	21	58 0.8	6.121
22	13	41	2.79	1.9978	15	28 8.3	10.108	22	15	22	25.07	2.2311	22	4 4.8	6.013
23	13	43	2.79	2.0022	-15	38 12.9	-10.045	23	15	24	39.08	2.2361	-22	10 2.3	-5.903
SEPTEMBER 19.							SEPTEMBER 21.								
0	13	45	3.05	2.0066	-15	48 13.7	-9.982	0	15	26	53.40	2.2411	-22	15 53.2	-5.793
1	13	47	3.58	2.0110	15	58 10.7	9.918	1	15	29	8.01	2.2459	22	21 37.5	5.682
2	13	49	4.37	2.0154	16	8 3.8	9.852	2	15	31	22.91	2.2508	22	27 15.0	5.569
3	13	51	5.43	2.0199	16	17 52.9	9.786	3	15	33	38.11	2.2557	22	32 45.8	5.457
4	13	53	6.76	2.0245	16	27 38.1	9.718	4	15	35	53.59	2.2605	22	38 9.8	5.343
5	13	55	8.37	2.0290	16	37 19.1	9.650	5	15	38	9.37	2.2653	22	43 26.9	5.227
6	13	57	10.24	2.0336	16	46 56.1	9.582	6	15	40	25.43	2.2701	22	48 37.0	5.111
7	13	59	12.40	2.0383	16	56 28.9	9.511	7	15	42	41.78	2.2749	22	53 40.2	4.994
8	14	1	14.83	2.0429	17	5 57.4	9.440	8	15	44	58.42	2.2796	22	58 36.3	4.877
9	14	3	17.55	2.0476	17	15 21.7	9.368	9	15	47	15.33	2.2843	23	3 25.4	4.758
10	14	5	20.54	2.0523	17	24 41.6	9.295	10	15	49	32.53	2.2889	23	8 7.3	4.638
11	14	7	23.82	2.0570	17	33 57.1	9.222	11	15	51	50.00	2.2935	23	12 41.9	4.518
12	14	9	27.38	2.0618	17	43 8.2	9.147	12	15	54	7.75	2.2981	23	17 9.4	4.397
13	14	11	31.23	2.0666	17	52 14.7	9.071	13	15	56	25.77	2.3027	23	21 29.5	4.274
14	14	13	35.37	2.0714	18	1 16.7	8.993	14	15	58	44.07	2.3072	23	25 42.3	4.151
15	14	15	39.80	2.0762	18	10 13.9	8.915	15	16	1	2.63	2.3116	23	29 47.6	4.027
16	14	17	44.51	2.0810	18	19 6.5	8.838	16	16	3	21.46	2.3161	23	33 45.5	3.903
17	14	19	49.52	2.0860	18	27 54.4	8.758	17	16	5	40.56	2.3204	23	37 35.9	3.777
18	14	21	54.83	2.0908	18	36 37.4	8.676	18	16	7	59.91	2.3247	23	41 18.7	3.650
19	14	24	0.42	2.0958	18	45 15.5	8.594	19	16	10	19.52	2.3290	23	44 53.9	3.523
20	14	26	6.32	2.1007	18	53 48.7	8.512	20	16	12	39.39	2.3333	23	48 21.4	3.394
21	14	28	12.50	2.1056	19	2 16.9	8.428	21	16	14	59.51	2.3374	23	51 41.2	3.265
22	14	30	18.99	2.1106	19	10 40.1	8.343	22	16	17	19.88	2.3415	23	54 53.2	3.135
23	14	32	25.77	2.1155	19	18 58.1	8.258	23	16	19	40.49	2.3456	23	57 57.4	3.005
24	14	34	32.85	2.1205	-19	27 11.0	-8.171	24	16	22	1.35	2.3497	-24	0 53.8	-2.874

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 22.					SEPTEMBER 24.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	16 22 1.35	2.3497	-24 0 53.8	-2.874	0	18 18 7.19	2.4578	-23 36 12.1	+ 4.060
1	16 24 22.45	2.3536	24 3 42.3	2.742	1	18 20 34.67	2.4581	23 32 4.6	4.199
2	16 26 43.78	2.3574	24 6 22.8	2.808	2	18 23 2.16	2.4582	23 27 48.2	4.348
3	16 29 5.34	2.3613	24 8 55.3	2.475	3	18 25 29.65	2.4583	23 23 22.8	4.498
4	16 31 27.14	2.3651	24 11 19.8	2.341	4	18 27 57.16	2.4584	23 18 48.4	4.648
5	16 33 49.15	2.3688	24 13 36.2	2.205	5	18 30 24.66	2.4583	23 14 5.0	4.797
6	16 36 11.39	2.3725	24 15 44.4	2.069	6	18 32 52.16	2.4583	23 9 12.8	4.945
7	16 38 33.85	2.3761	24 17 44.5	1.933	7	18 35 19.66	2.4581	23 4 11.6	5.094
8	16 40 56.52	2.3796	24 19 36.4	1.797	8	18 37 47.13	2.4578	22 59 1.5	5.243
9	16 43 19.40	2.3831	24 21 20.1	1.658	9	18 40 14.59	2.4575	22 53 42.5	5.391
10	16 45 42.49	2.3865	24 22 55.4	1.519	10	18 42 42.03	2.4571	22 48 14.6	5.538
11	16 48 5.78	2.3898	24 24 22.4	1.381	11	18 45 9.44	2.4566	22 42 37.9	5.686
12	16 50 29.26	2.3930	24 25 41.1	1.242	12	18 47 36.82	2.4560	22 36 52.3	5.833
13	16 52 52.94	2.3963	24 26 51.4	1.101	13	18 50 4.16	2.4554	22 30 57.9	5.979
14	16 55 16.81	2.3993	24 27 53.2	0.960	14	18 52 31.47	2.4548	22 24 54.8	6.125
15	16 57 40.86	2.4023	24 28 46.6	0.819	15	18 54 58.73	2.4540	22 18 42.9	6.272
16	17 0 5.09	2.4053	24 29 31.5	0.677	16	18 57 25.95	2.4532	22 12 22.2	6.418
17	17 2 29.50	2.4083	24 30 7.8	0.533	17	18 59 53.11	2.4523	22 5 52.8	6.563
18	17 4 54.08	2.4111	24 30 35.5	0.391	18	19 2 20.22	2.4513	21 59 14.7	6.707
19	17 7 18.83	2.4138	24 30 54.7	0.248	19	19 4 47.27	2.4503	21 52 28.0	6.851
20	17 9 43.73	2.4164	24 31 5.2	-0.103	20	19 7 14.26	2.4493	21 45 32.6	6.994
21	17 12 8.80	2.4191	24 31 7.1	+0.041	21	19 9 41.18	2.4482	21 38 28.7	7.138
22	17 14 34.02	2.4215	24 31 0.3	0.187	22	19 12 8.04	2.4470	21 31 16.1	7.280
23	17 16 59.38	2.4239	-24 30 44.7	+0.332	23	19 14 34.82	2.4457	-21 23 55.1	+ 7.422
SEPTEMBER 23.					SEPTEMBER 25.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	17 19 24.89	2.4263	-24 30 20.5	+0.477	0	19 17 1.52	2.4443	-21 16 25.5	+ 7.563
1	17 21 50.54	2.4286	24 29 47.5	0.823	1	19 19 28.14	2.4430	21 8 47.5	7.703
2	17 24 16.32	2.4308	24 29 5.7	0.770	2	19 21 54.68	2.4417	21 1 1.1	7.843
3	17 26 42.23	2.4328	24 28 15.1	0.917	3	19 24 21.14	2.4403	20 53 6.3	7.983
4	17 29 8.26	2.4348	24 27 15.7	1.064	4	19 26 47.51	2.4387	20 45 3.1	8.122
5	17 31 34.41	2.4368	24 26 7.4	1.212	5	19 29 13.78	2.4371	20 36 51.7	8.259
6	17 34 0.68	2.4387	24 24 50.3	1.359	6	19 31 39.96	2.4356	20 28 32.0	8.397
7	17 36 27.05	2.4404	24 23 24.3	1.508	7	19 34 6.05	2.4339	20 20 4.1	8.533
8	17 38 53.53	2.4422	24 21 49.4	1.657	8	19 36 32.03	2.4322	20 11 28.1	8.668
9	17 41 20.11	2.4438	24 20 5.5	1.805	9	19 38 57.91	2.4305	20 2 43.9	8.804
10	17 43 46.78	2.4453	24 18 12.8	1.953	10	19 41 23.69	2.4288	19 53 51.6	8.938
11	17 46 13.54	2.4467	24 16 11.1	2.103	11	19 43 49.36	2.4269	19 44 51.4	9.071
12	17 48 40.38	2.4480	24 14 0.5	2.252	12	19 46 14.92	2.4251	19 35 43.1	9.203
13	17 51 7.30	2.4493	24 11 40.9	2.402	13	19 48 40.37	2.4232	19 26 27.0	9.335
14	17 53 34.30	2.4505	24 9 12.3	2.551	14	19 51 5.70	2.4213	19 17 2.9	9.466
15	17 56 1.36	2.4516	24 6 34.8	2.701	15	19 53 30.92	2.4194	19 7 31.1	9.595
16	17 58 28.49	2.4526	24 3 48.2	2.851	16	19 55 56.03	2.4174	18 57 51.5	9.723
17	18 0 55.67	2.4535	24 0 52.7	3.001	17	19 58 21.01	2.4154	18 48 4.3	9.851
18	18 3 22.91	2.4544	23 57 48.1	3.151	18	20 0 45.88	2.4134	18 38 9.4	9.978
19	18 5 50.20	2.4552	23 54 34.6	3.300	19	20 3 10.62	2.4113	18 28 6.9	10.106
20	18 8 17.53	2.4558	23 51 12.1	3.450	20	20 5 35.24	2.4093	18 17 56.8	10.230
21	18 10 44.90	2.4564	23 47 40.6	3.600	21	20 7 59.73	2.4072	18 7 39.3	10.353
22	18 13 12.30	2.4570	23 44 0.1	3.750	22	20 10 24.10	2.4052	17 57 14.4	10.476
23	18 15 39.74	2.4574	23 40 10.6	3.900	23	20 12 48.35	2.4030	17 46 42.2	10.598
24	18 18 7.19	2.4578	-23 36 12.1	+4.060	24	20 15 12.46	2.4008	-17 36 2.7	+10.718

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 26.					SEPTEMBER 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 15 12.46	2.4008	-17 36 2.7	+10.718	0	22 8 2.83	2.3086	-7 6 51.5	+14.940
1	20 17 36.44	2.3987	17 25 16.0	10.838	1	22 10 21.31	2.3074	6 51 53.6	14.990
2	20 20 0.30	2.3965	17 14 22.2	10.957	2	22 12 39.72	2.3063	6 36 52.7	15.038
3	20 22 24.02	2.3943	17 3 21.2	11.074	3	22 14 58.06	2.3052	6 21 49.0	15.085
4	20 24 47.61	2.3922	16 52 13.3	11.189	4	22 17 16.34	2.3042	6 6 42.5	15.130
5	20 27 11.08	2.3899	16 40 58.5	11.304	5	22 19 34.56	2.3031	5 51 33.4	15.173
6	20 29 34.40	2.3877	16 29 36.8	11.418	6	22 21 52.71	2.3021	5 36 21.8	15.213
7	20 31 57.60	2.3856	16 18 8.3	11.531	7	22 24 10.81	2.3013	5 21 7.8	15.253
8	20 34 20.67	2.3833	16 6 33.1	11.643	8	22 26 28.86	2.3004	5 5 51.4	15.291
9	20 36 43.60	2.3811	15 54 51.2	11.753	9	22 28 46.86	2.2996	4 50 32.9	15.327
10	20 39 6.40	2.3789	15 43 2.8	11.862	10	22 31 4.81	2.2988	4 35 12.2	15.363
11	20 41 29.07	2.3768	15 31 7.8	11.969	11	22 33 22.72	2.2982	4 19 49.5	15.393
12	20 43 51.61	2.3745	15 19 6.5	12.075	12	22 35 40.59	2.2975	4 4 25.0	15.423
13	20 46 14.01	2.3723	15 6 58.8	12.181	13	22 37 58.42	2.2968	3 48 58.7	15.453
14	20 48 36.29	2.3702	14 54 44.8	12.285	14	22 40 16.21	2.2963	3 33 30.7	15.479
15	20 50 58.43	2.3679	14 42 24.6	12.388	15	22 42 33.97	2.2958	3 18 1.2	15.504
16	20 53 20.44	2.3658	14 29 58.3	12.488	16	22 44 51.70	2.2953	3 2 30.2	15.528
17	20 55 42.32	2.3636	14 17 26.0	12.588	17	22 47 9.41	2.2949	2 46 57.8	15.549
18	20 58 4.07	2.3614	14 4 47.8	12.686	18	22 49 27.09	2.2946	2 31 24.3	15.568
19	21 0 25.69	2.3593	13 52 3.7	12.783	19	22 51 44.76	2.2943	2 15 49.6	15.587
20	21 2 47.18	2.3572	13 39 13.8	12.879	20	22 54 2.41	2.2940	2 0 13.9	15.603
21	21 5 8.55	2.3551	13 26 18.2	12.973	21	22 56 20.04	2.2938	1 44 37.3	15.617
22	21 7 29.79	2.3530	13 13 17.0	13.067	22	22 58 37.66	2.2937	1 28 59.9	15.629
23	21 9 50.91	2.3508	-13 0 10.2	+13.158	23	23 0 55.28	2.2936	-1 13 21.8	+15.639
SEPTEMBER 27.					SEPTEMBER 29.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 12 11.89	2.3488	-12 46 58.0	+13.248	0	23 3 12.89	2.2935	-0 57 43.2	+15.648
1	21 14 32.76	2.3468	12 33 40.5	13.336	1	23 5 30.50	2.2936	0 42 4.1	15.654
2	21 16 53.51	2.3448	12 20 17.7	13.423	2	23 7 48.12	2.2937	0 26 24.7	15.659
3	21 19 14.13	2.3428	12 6 49.7	13.509	3	23 10 5.74	2.2938	-0 10 45.0	15.663
4	21 21 34.64	2.3408	11 53 16.6	13.593	4	23 12 23.37	2.2939	+0 4 54.8	15.663
5	21 23 55.03	2.3389	11 39 38.6	13.675	5	23 14 41.01	2.2941	0 20 34.6	15.663
6	21 26 15.31	2.3370	11 25 55.6	13.757	6	23 16 58.66	2.2944	0 36 14.3	15.660
7	21 28 35.47	2.3352	11 12 7.8	13.836	7	23 19 16.34	2.2948	0 51 53.8	15.656
8	21 30 55.53	2.3333	10 58 15.3	13.913	8	23 21 34.03	2.2951	1 7 33.0	15.650
9	21 33 15.47	2.3314	10 44 18.2	13.989	9	23 23 51.75	2.2956	1 23 11.8	15.641
10	21 35 35.30	2.3297	10 30 16.6	14.065	10	23 26 9.50	2.2961	1 38 49.9	15.631
11	21 37 55.03	2.3279	10 16 10.4	14.138	11	23 28 27.28	2.2966	1 54 27.5	15.620
12	21 40 14.65	2.3262	10 2 0.0	14.209	12	23 30 45.09	2.2972	2 10 4.3	15.606
13	21 42 34.17	2.3245	9 47 45.3	14.279	13	23 33 2.94	2.2978	2 25 40.2	15.589
14	21 44 53.59	2.3229	9 33 26.5	14.348	14	23 35 20.83	2.2985	2 41 15.0	15.572
15	21 47 12.92	2.3213	9 19 3.6	14.415	15	23 37 38.76	2.2993	2 56 48.8	15.553
16	21 49 32.14	2.3197	9 4 36.7	14.480	16	23 39 56.74	2.3001	3 12 21.3	15.531
17	21 51 51.28	2.3183	8 50 6.0	14.543	17	23 42 14.77	2.3009	3 27 52.5	15.508
18	21 54 10.33	2.3167	8 35 31.6	14.604	18	23 44 32.85	2.3018	3 43 22.3	15.483
19	21 56 29.28	2.3152	8 20 53.5	14.665	19	23 46 50.98	2.3027	3 58 50.5	15.456
20	21 58 48.15	2.3138	8 6 11.8	14.723	20	23 49 9.17	2.3037	4 14 17.0	15.428
21	22 1 6.94	2.3125	7 51 26.7	14.780	21	23 51 27.42	2.3047	4 29 41.8	15.398
22	22 3 25.65	2.3112	7 36 38.2	14.836	22	23 53 45.73	2.3058	4 45 4.7	15.365
23	22 5 44.28	2.3098	7 21 46.4	14.889	23	23 56 4.11	2.3069	5 0 25.6	15.330
24	22 8 2.83	2.3086	-7 6 51.5	+14.940	24	23 58 22.56	2.3081	+5 15 44.3	+15.282



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
SEPTEMBER 30.					OCTOBER 2.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 58 22.56	2.3081	+ 5 15 44.3	+15.293	0	1 51 9.02	2.3983	+16 15 4.3	+11.555
1	0 0 41.08	2.3093	5 31 0.8	15.257	1	1 53 32.98	2.4004	16 26 34.2	11.440
2	0 2 59.68	2.3106	5 46 15.1	15.217	2	1 55 57.07	2.4024	16 37 57.1	11.323
3	0 5 18.35	2.3118	6 1 26.8	15.175	3	1 58 21.27	2.4044	16 49 13.0	11.207
4	0 7 37.10	2.3132	6 16 36.1	15.132	4	2 0 45.60	2.4065	17 0 21.9	11.088
5	0 9 55.93	2.3146	6 31 42.6	15.086	5	2 3 10.05	2.4085	17 11 23.6	10.968
6	0 12 14.85	2.3160	6 46 46.4	15.040	6	2 5 34.62	2.4104	17 22 18.1	10.848
7	0 14 33.85	2.3174	7 1 47.4	14.991	7	2 7 59.30	2.4123	17 33 5.4	10.726
8	0 16 52.94	2.3190	7 16 45.3	14.940	8	2 10 24.10	2.4143	17 43 45.2	10.603
9	0 19 12.13	2.3205	7 31 40.2	14.888	9	2 12 49.02	2.4162	17 54 17.7	10.478
10	0 21 31.40	2.3221	7 46 31.8	14.833	10	2 15 14.04	2.4180	18 4 42.6	10.353
11	0 23 50.78	2.3237	8 1 20.2	14.778	11	2 17 39.18	2.4198	18 15 0.1	10.228
12	0 26 10.24	2.3253	8 16 5.2	14.720	12	2 20 4.42	2.4216	18 25 9.9	10.099
13	0 28 29.81	2.3270	8 30 46.6	14.661	13	2 22 29.77	2.4234	18 35 12.0	9.971
14	0 30 49.48	2.3288	8 45 24.5	14.599	14	2 24 55.23	2.4251	18 45 6.4	9.842
15	0 33 9.26	2.3305	8 59 58.5	14.536	15	2 27 20.78	2.4267	18 54 53.0	9.712
16	0 35 29.14	2.3323	9 14 28.8	14.472	16	2 29 46.43	2.4283	19 4 31.8	9.580
17	0 37 49.13	2.3341	9 28 55.1	14.405	17	2 32 12.18	2.4300	19 14 2.6	9.448
18	0 40 9.23	2.3360	9 43 17.4	14.337	18	2 34 38.03	2.4315	19 23 25.5	9.315
19	0 42 29.45	2.3378	9 57 35.5	14.267	19	2 37 3.96	2.4329	19 32 40.4	9.181
20	0 44 49.77	2.3397	10 11 49.4	14.196	20	2 39 29.98	2.4343	19 41 47.2	9.047
21	0 47 10.21	2.3417	10 25 59.0	14.123	21	2 41 56.08	2.4358	19 50 46.0	8.911
22	0 49 30.77	2.3436	10 40 4.1	14.048	22	2 44 22.27	2.4372	19 59 36.5	8.773
23	0 51 51.44	2.3456	+10 54 4.7	+13.971	23	2 46 48.54	2.4384	+20 8 18.8	+ 8.637
OCTOBER 1.					OCTOBER 3.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	0 54 12.24	2.3476	+11 8 0.6	+13.893	0	2 49 14.88	2.4397	+20 16 52.9	+ 8.499
1	0 56 33.15	2.3496	11 21 51.8	13.813	1	2 51 41.30	2.4408	20 25 18.7	8.360
2	0 58 54.19	2.3516	11 35 38.1	13.731	2	2 54 7.78	2.4419	20 33 36.1	8.220
3	1 1 15.34	2.3536	11 49 19.5	13.648	3	2 56 34.33	2.4431	20 41 45.1	8.080
4	1 3 36.62	2.3558	12 2 55.8	13.563	4	2 59 0.95	2.4441	20 49 45.7	7.940
5	1 5 58.03	2.3578	12 16 27.0	13.477	5	3 1 27.62	2.4450	20 57 37.9	7.798
6	1 8 19.56	2.3599	12 29 53.0	13.389	6	3 3 54.35	2.4458	21 5 21.5	7.656
7	1 10 41.22	2.3620	12 43 13.7	13.299	7	3 6 21.12	2.4467	21 12 56.6	7.514
8	1 13 3.00	2.3641	12 56 28.9	13.208	8	3 8 47.95	2.4475	21 20 23.2	7.371
9	1 15 24.91	2.3663	13 9 38.7	13.116	9	3 11 14.82	2.4482	21 27 41.1	7.227
10	1 17 46.95	2.3683	13 22 42.8	13.022	10	3 13 41.73	2.4488	21 34 50.4	7.083
11	1 20 9.11	2.3705	13 35 41.3	12.927	11	3 16 8.67	2.4493	21 41 51.1	6.938
12	1 22 31.41	2.3728	13 48 34.0	12.829	12	3 18 35.64	2.4498	21 48 43.0	6.793
13	1 24 53.84	2.3748	14 1 20.8	12.731	13	3 21 2.64	2.4502	21 55 26.2	6.648
14	1 27 16.39	2.3770	14 14 1.7	12.631	14	3 23 29.66	2.4505	22 2 0.7	6.502
15	1 29 39.08	2.3792	14 26 36.5	12.529	15	3 25 56.70	2.4508	22 8 26.4	6.355
16	1 32 1.89	2.3813	14 39 5.2	12.427	16	3 28 23.76	2.4510	22 14 43.3	6.208
17	1 34 24.83	2.3835	14 51 27.7	12.323	17	3 30 50.82	2.4511	22 20 51.4	6.062
18	1 36 47.91	2.3857	15 3 43.9	12.217	18	3 33 17.89	2.4511	22 26 50.7	5.914
19	1 39 11.11	2.3878	15 15 53.7	12.110	19	3 35 44.95	2.4511	22 32 41.1	5.766
20	1 41 34.44	2.3898	15 27 57.1	12.002	20	3 38 12.02	2.4510	22 38 22.6	5.618
21	1 43 57.89	2.3920	15 39 53.9	11.892	21	3 40 39.07	2.4508	22 43 55.3	5.470
22	1 46 21.48	2.3942	15 51 44.1	11.781	22	3 43 6.11	2.4505	22 49 19.0	5.322
23	1 48 45.19	2.3962	16 3 27.6	11.668	23	3 45 33.13	2.4502	22 54 33.9	5.173
24	1 51 9.02	2.3983	+16 15 4.3	+11.555	24	3 48 0.13	2.4498	+22 59 39.8	+ 5.024

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.
OCTOBER 4.							OCTOBER 6.						
	h	m	s	s	"	"		h	m	s	s	"	"
0	3	48	0.13	2.4498	+22 59 39.8	+5.024	0	5	43	31.31	2.3338	+24 12 0.8	-1.863
1	3	50	27.10	2.4492	23 4 36.8	4.876	1	5	45	51.21	2.3297	24 10 5.1	1.994
2	3	52	54.03	2.4486	23 9 24.9	4.727	2	5	48	10.87	2.3255	24 8 1.5	2.125
3	3	55	20.93	2.4479	23 14 4.0	4.578	3	5	50	30.27	2.3212	24 5 50.1	2.253
4	3	57	47.78	2.4472	23 18 34.2	4.428	4	5	52	49.41	2.3169	24 3 31.1	2.382
5	4	0	14.59	2.4463	23 22 55.4	4.279	5	5	55	8.30	2.3126	24 1 4.3	2.509
6	4	2	41.34	2.4453	23 27 7.7	4.131	6	5	57	26.92	2.3081	23 58 30.0	2.636
7	4	5	8.03	2.4443	23 31 11.1	3.982	7	5	59	45.27	2.3037	23 55 48.0	2.763
8	4	7	34.66	2.4433	23 35 5.5	3.833	8	6	2	3.36	2.2993	23 52 58.5	2.887
9	4	10	1.22	2.4421	23 38 51.0	3.683	9	6	4	21.18	2.2948	23 50 1.6	3.011
10	4	12	27.71	2.4408	23 42 27.5	3.534	10	6	6	38.73	2.2902	23 46 57.2	3.135
11	4	14	54.12	2.4394	23 45 55.1	3.386	11	6	8	56.00	2.2855	23 43 45.4	3.258
12	4	17	20.44	2.4380	23 49 13.8	3.237	12	6	11	12.99	2.2808	23 40 26.3	3.379
13	4	19	46.68	2.4365	23 52 23.5	3.088	13	6	13	29.70	2.2762	23 36 59.9	3.500
14	4	22	12.82	2.4348	23 55 24.4	2.940	14	6	15	46.13	2.2715	23 33 26.3	3.619
15	4	24	38.86	2.4332	23 58 16.3	2.792	15	6	18	2.28	2.2668	23 29 45.6	3.738
16	4	27	4.80	2.4313	24 0 59.4	2.644	16	6	20	18.14	2.2620	23 25 57.7	3.858
17	4	29	30.62	2.4295	24 3 33.6	2.496	17	6	22	33.72	2.2572	23 22 2.7	3.975
18	4	31	56.34	2.4277	24 5 58.9	2.348	18	6	24	49.00	2.2523	23 18 0.7	4.092
19	4	34	21.94	2.4256	24 8 15.4	2.202	19	6	27	3.99	2.2474	23 13 51.7	4.207
20	4	36	47.41	2.4234	24 10 23.1	2.054	20	6	29	18.69	2.2426	23 9 35.9	4.322
21	4	39	12.75	2.4213	24 12 21.9	1.908	21	6	31	33.10	2.2377	23 5 13.1	4.436
22	4	41	37.96	2.4190	24 14 12.0	1.762	22	6	33	47.21	2.2328	23 0 43.6	4.548
23	4	44	3.03	2.4167	+24 15 53.3	+1.615	23	6	36	1.03	2.2278	+22 56 7.3	-4.661
OCTOBER 5.							OCTOBER 7.						
0	4	46	27.96	2.4143	+24 17 25.8	+1.469	0	6	38	14.55	2.2228	+22 51 24.3	-4.772
1	4	48	52.74	2.4117	24 18 49.6	1.325	1	6	40	27.77	2.2178	22 46 34.7	4.882
2	4	51	17.36	2.4091	24 20 4.8	1.180	2	6	42	40.69	2.2129	22 41 38.5	4.992
3	4	53	41.83	2.4065	24 21 11.2	1.036	3	6	44	53.32	2.2079	22 36 35.7	5.100
4	4	56	6.14	2.4038	24 22 9.1	0.893	4	6	47	5.64	2.2028	22 31 26.5	5.208
5	4	58	30.28	2.4008	24 22 58.3	0.748	5	6	49	17.65	2.1978	22 26 10.8	5.314
6	5	0	54.24	2.3979	24 23 38.9	0.606	6	6	51	29.37	2.1928	22 20 48.8	5.419
7	5	3	18.03	2.3950	24 24 11.0	0.463	7	6	53	40.78	2.1879	22 15 20.5	5.524
8	5	5	41.64	2.3919	24 24 34.5	0.322	8	6	55	51.89	2.1827	22 9 45.9	5.628
9	5	8	5.06	2.3888	24 24 49.6	0.181	9	6	58	2.70	2.1776	22 4 5.1	5.731
10	5	10	28.29	2.3856	24 24 56.2	+0.039	10	7	0	13.20	2.1725	21 58 18.2	5.833
11	5	12	51.33	2.3823	24 24 54.3	-0.101	11	7	2	23.40	2.1674	21 52 25.2	5.934
12	5	15	14.17	2.3790	24 24 44.1	0.240	12	7	4	33.29	2.1623	21 46 26.1	6.034
13	5	17	36.81	2.3756	24 24 25.5	0.378	13	7	6	42.88	2.1573	21 40 21.1	6.133
14	5	19	59.24	2.3720	24 23 58.7	0.517	14	7	8	52.16	2.1522	21 34 10.1	6.233
15	5	22	21.45	2.3685	24 23 23.5	0.655	15	7	11	1.14	2.1471	21 27 53.2	6.329
16	5	24	43.46	2.3649	24 22 40.1	0.792	16	7	13	9.81	2.1421	21 21 30.6	6.425
17	5	27	5.24	2.3613	24 21 48.5	0.928	17	7	15	18.19	2.1370	21 15 2.2	6.522
18	5	29	26.81	2.3575	24 20 48.7	1.064	18	7	17	26.25	2.1319	21 8 28.0	6.617
19	5	31	48.14	2.3537	24 19 40.8	1.199	19	7	19	34.02	2.1269	21 1 48.2	6.710
20	5	34	9.25	2.3499	24 18 24.8	1.334	20	7	21	41.48	2.1219	20 55 2.8	6.803
21	5	36	30.13	2.3459	24 17 0.7	1.468	21	7	23	48.65	2.1169	20 48 11.9	6.894
22	5	38	50.76	2.3419	24 15 28.7	1.600	22	7	25	55.51	2.1118	20 41 15.5	6.986
23	5	41	11.16	2.3379	24 13 48.7	1.733	23	7	28	2.07	2.1068	20 34 13.6	7.076
24	5	43	31.31	2.3338	+24 12 0.8	-1.863	24	7	30	8.33	2.1018	+20 27 6.4	-7.168



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 8.					OCTOBER 10.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	7 30 8.33	2.1018	+20 27 6.4	-7.165	0	9 5 48.49	1.8986	+13 16 42.2	-10.455
1	7 32 14.29	2.0969	20 19 53.8	7.253	1	9 7 42.31	1.8954	13 6 13.4	10.504
2	7 34 19.96	2.0920	20 12 36.0	7.341	2	9 9 35.94	1.8923	12 55 41.7	10.553
3	7 36 25.33	2.0870	20 5 12.9	7.428	3	9 11 29.38	1.8891	12 45 7.0	10.602
4	7 38 30.40	2.0822	19 57 44.7	7.513	4	9 13 22.63	1.8860	12 34 29.5	10.648
5	7 40 35.19	2.0773	19 50 11.4	7.598	5	9 15 15.70	1.8831	12 23 49.2	10.696
6	7 42 39.67	2.0723	19 42 33.0	7.683	6	9 17 8.60	1.8802	12 13 6.1	10.741
7	7 44 43.87	2.0676	19 34 49.5	7.765	7	9 19 1.32	1.8773	12 2 20.3	10.786
8	7 46 47.78	2.0627	19 27 1.2	7.847	8	9 20 53.87	1.8744	11 51 31.8	10.831
9	7 48 51.39	2.0578	19 19 7.9	7.928	9	9 22 46.25	1.8716	11 40 40.6	10.874
10	7 50 54.72	2.0532	19 11 9.8	8.008	10	9 24 38.46	1.8688	11 29 46.9	10.918
11	7 52 57.77	2.0484	19 3 6.9	8.088	11	9 26 30.51	1.8662	11 18 50.5	10.960
12	7 55 0.53	2.0437	18 54 59.2	8.167	12	9 28 22.40	1.8635	11 7 51.7	11.001
13	7 57 3.01	2.0390	18 46 46.9	8.245	13	9 30 14.13	1.8609	10 56 50.4	11.042
14	7 59 5.21	2.0343	18 38 29.8	8.323	14	9 32 5.71	1.8584	10 45 46.7	11.082
15	8 1 7.13	2.0297	18 30 8.2	8.398	15	9 33 57.14	1.8560	10 34 40.6	11.122
16	8 3 8.77	2.0250	18 21 42.1	8.473	16	9 35 48.43	1.8536	10 23 32.1	11.161
17	8 5 10.13	2.0205	18 13 11.5	8.548	17	9 37 39.57	1.8512	10 12 21.3	11.198
18	8 7 11.23	2.0160	18 4 36.4	8.622	18	9 39 30.57	1.8489	10 1 8.3	11.236
19	8 9 12.05	2.0115	17 55 56.9	8.693	19	9 41 21.44	1.8467	9 49 53.0	11.273
20	8 11 12.61	2.0071	17 47 13.2	8.765	20	9 43 12.17	1.8444	9 38 35.5	11.310
21	8 13 12.90	2.0026	17 38 25.1	8.838	21	9 45 2.77	1.8423	9 27 15.8	11.345
22	8 15 12.92	1.9982	17 29 32.7	8.908	22	9 46 53.25	1.8403	9 15 54.1	11.380
23	8 17 12.68	1.9938	+17 20 36.2	-8.976	23	9 48 43.60	1.8382	+ 9 4 30.2	-11.414
OCTOBER 9.					OCTOBER 11.				
0	8 19 12.18	1.9896	+17 11 35.6	-9.044	0	9 50 33.83	1.8363	+ 8 53 4.4	-11.447
1	8 21 11.42	1.9853	17 2 30.9	9.113	1	9 52 23.95	1.8343	8 41 36.6	11.480
2	8 23 10.41	1.9810	16 53 22.1	9.180	2	9 54 13.95	1.8324	8 30 6.8	11.513
3	8 25 9.14	1.9768	16 44 9.3	9.246	3	9 56 3.84	1.8306	8 18 35.1	11.544
4	8 27 7.62	1.9726	16 34 52.6	9.311	4	9 57 53.62	1.8288	8 7 1.5	11.575
5	8 29 5.85	1.9685	16 25 32.0	9.376	5	9 59 43.30	1.8272	7 55 26.1	11.604
6	8 31 3.84	1.9644	16 16 7.5	9.439	6	10 1 32.88	1.8256	7 43 49.0	11.634
7	8 33 1.58	1.9603	16 6 39.3	9.502	7	10 3 22.37	1.8240	7 32 10.0	11.663
8	8 34 59.08	1.9564	15 57 7.3	9.565	8	10 5 11.76	1.8224	7 20 29.4	11.691
9	8 36 56.35	1.9524	15 47 31.5	9.626	9	10 7 1.06	1.8210	7 8 47.1	11.719
10	8 38 53.37	1.9485	15 37 52.2	9.686	10	10 8 50.28	1.8196	6 57 3.1	11.746
11	8 40 50.17	1.9447	15 28 9.2	9.747	11	10 10 39.41	1.8182	6 45 17.6	11.772
12	8 42 46.73	1.9408	15 18 22.6	9.806	12	10 12 28.46	1.8169	6 33 30.5	11.798
13	8 44 43.06	1.9370	15 8 32.5	9.863	13	10 14 17.44	1.8157	6 21 41.9	11.823
14	8 46 39.17	1.9333	14 58 39.0	9.921	14	10 16 6.34	1.8145	6 9 51.8	11.847
15	8 48 35.06	1.9297	14 48 42.0	9.978	15	10 17 55.18	1.8133	5 58 0.3	11.870
16	8 50 30.73	1.9260	14 38 41.6	10.034	16	10 19 43.94	1.8123	5 46 7.4	11.893
17	8 52 26.18	1.9223	14 28 37.9	10.089	17	10 21 32.65	1.8113	5 34 13.2	11.915
18	8 54 21.41	1.9188	14 18 30.9	10.143	18	10 23 21.30	1.8103	5 22 17.6	11.938
19	8 56 16.44	1.9153	14 8 20.7	10.198	19	10 25 9.89	1.8094	5 10 20.7	11.958
20	8 58 11.25	1.9119	13 58 7.2	10.251	20	10 26 58.43	1.8085	4 58 22.7	11.978
21	9 0 5.87	1.9085	13 47 50.6	10.303	21	10 28 46.91	1.8078	4 46 23.4	11.998
22	9 2 0.27	1.9051	13 37 30.8	10.355	22	10 30 35.36	1.8071	4 34 22.9	12.018
23	9 3 54.48	1.9018	13 27 8.0	10.405	23	10 32 23.76	1.8063	4 22 21.3	12.035
24	9 5 48.49	1.8986	+13 16 42.2	-10.455	24	10 34 12.12	1.8058	+ 4 10 18.7	-12.053

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 12.					OCTOBER 14.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	10 34 12.12	1.8058	+4 10 18.7	-12.053	0	12 1 15.64	1.8434	-5 35 48.6	-12.100
1	10 36 0.45	1.8053	3 58 15.0	12.070	1	12 3 6.31	1.8457	5 47 54.1	12.083
2	10 37 48.75	1.8047	3 46 10.3	12.086	2	12 4 57.12	1.8479	5 59 58.6	12.065
3	10 39 37.01	1.8043	3 34 4.7	12.102	3	12 6 48.06	1.8501	6 12 1.9	12.047
4	10 41 25.26	1.8039	3 21 58.1	12.118	4	12 8 39.13	1.8524	6 24 4.2	12.028
5	10 43 13.48	1.8035	3 9 50.6	12.132	5	12 10 30.35	1.8548	6 36 5.3	12.008
6	10 45 1.68	1.8033	2 57 42.3	12.145	6	12 12 21.71	1.8573	6 48 5.2	11.987
7	10 46 49.87	1.8031	2 45 33.2	12.158	7	12 14 13.22	1.8598	7 0 3.7	11.965
8	10 48 38.05	1.8029	2 33 23.3	12.171	8	12 16 4.88	1.8623	7 12 1.0	11.943
9	10 50 26.22	1.8028	2 21 12.7	12.183	9	12 17 56.69	1.8648	7 23 56.9	11.920
10	10 52 14.39	1.8028	2 9 1.4	12.194	10	12 19 48.66	1.8675	7 35 51.4	11.896
11	10 54 2.56	1.8028	1 56 49.4	12.204	11	12 21 40.79	1.8702	7 47 44.4	11.871
12	10 55 50.73	1.8029	1 44 36.9	12.213	12	12 23 33.08	1.8729	7 59 35.9	11.845
13	10 57 38.91	1.8030	1 32 23.8	12.223	13	12 25 25.54	1.8758	8 11 25.8	11.819
14	10 59 27.09	1.8032	1 20 10.2	12.232	14	12 27 18.17	1.8786	8 23 14.2	11.792
15	11 1 15.29	1.8035	1 7 56.0	12.239	15	12 29 10.97	1.8814	8 35 0.8	11.763
16	11 3 3.51	1.8038	0 55 41.5	12.246	16	12 31 3.94	1.8843	8 46 45.8	11.735
17	11 4 51.75	1.8042	0 43 26.5	12.253	17	12 32 57.09	1.8874	8 58 29.0	11.704
18	11 6 40.01	1.8045	0 31 11.2	12.258	18	12 34 50.43	1.8904	9 10 10.3	11.673
19	11 8 28.29	1.8050	0 18 55.5	12.263	19	12 36 43.94	1.8935	9 21 49.8	11.643
20	11 10 16.61	1.8056	+0 6 39.6	12.268	20	12 38 37.65	1.8968	9 33 27.4	11.610
21	11 12 4.96	1.8062	-0 5 36.6	12.271	21	12 40 31.55	1.8998	9 45 3.0	11.577
22	11 13 53.35	1.8068	0 17 52.9	12.274	22	12 42 25.63	1.9031	9 56 36.6	11.543
23	11 15 41.78	1.8075	-0 30 9.5	-12.277	23	12 44 19.92	1.9064	-10 8 8.1	-11.508
OCTOBER 13.					OCTOBER 15.				
0	11 17 30.25	1.8083	-0 42 26.1	-12.278	0	12 46 14.40	1.9098	-10 19 37.5	-11.472
1	11 19 18.77	1.8091	0 54 42.8	12.278	1	12 48 9.09	1.9132	10 31 4.7	11.435
2	11 21 7.34	1.8100	1 6 59.5	12.278	2	12 50 3.98	1.9165	10 42 29.7	11.398
3	11 22 55.97	1.8109	1 19 16.2	12.278	3	12 51 59.07	1.9200	10 53 52.4	11.359
4	11 24 44.65	1.8118	1 31 32.9	12.277	4	12 53 54.38	1.9236	11 5 12.8	11.319
5	11 26 33.39	1.8129	1 43 49.4	12.275	5	12 55 49.90	1.9271	11 16 30.7	11.278
6	11 28 22.20	1.8141	1 56 5.9	12.273	6	12 57 45.63	1.9307	11 27 46.2	11.238
7	11 30 11.08	1.8153	2 8 22.1	12.269	7	12 59 41.58	1.9344	11 38 59.2	11.196
8	11 32 0.03	1.8164	2 20 38.2	12.265	8	13 1 37.76	1.9381	11 50 9.7	11.153
9	11 33 49.05	1.8177	2 32 53.9	12.260	9	13 3 34.15	1.9418	12 1 17.5	11.108
10	11 35 38.15	1.8190	2 45 9.4	12.255	10	13 5 30.78	1.9457	12 12 22.7	11.063
11	11 37 27.33	1.8204	2 57 24.5	12.248	11	13 7 27.63	1.9494	12 23 25.1	11.017
12	11 39 16.60	1.8219	3 9 39.2	12.242	12	13 9 24.71	1.9533	12 34 24.7	10.970
13	11 41 5.96	1.8233	3 21 53.5	12.233	13	13 11 22.02	1.9572	12 45 21.5	10.923
14	11 42 55.40	1.8248	3 34 7.2	12.225	14	13 13 19.57	1.9612	12 56 15.4	10.874
15	11 44 44.94	1.8265	3 46 20.5	12.217	15	13 15 17.36	1.9653	13 7 6.4	10.824
16	11 46 34.58	1.8283	3 58 33.2	12.206	16	13 17 15.40	1.9693	13 17 54.3	10.773
17	11 48 24.33	1.8299	4 10 45.2	12.195	17	13 19 13.67	1.9733	13 28 39.2	10.723
18	11 50 14.17	1.8317	4 22 56.6	12.184	18	13 21 12.19	1.9774	13 39 21.0	10.670
19	11 52 4.13	1.8335	4 35 7.3	12.173	19	13 23 10.96	1.9815	13 49 59.6	10.617
20	11 53 54.19	1.8354	4 47 17.3	12.159	20	13 25 9.97	1.9858	14 0 35.0	10.562
21	11 55 44.38	1.8378	4 59 26.4	12.145	21	13 27 9.25	1.9900	14 11 7.0	10.506
22	11 57 34.67	1.8393	5 11 34.7	12.131	22	13 29 8.77	1.9942	14 21 35.7	10.450
23	11 59 25.10	1.8414	5 23 42.1	12.116	23	13 31 8.55	1.9985	14 32 1.0	10.393
24	12 1 15.64	1.8434	-5 35 48.6	-12.100	24	13 33 8.59	2.0028	-14 42 22.8	-10.334

## GREENWICH MEAN TIME.

Hour.	Right Ascension			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.
OCTOBER 16.							OCTOBER 18.						
	h	m	s	s	"	"		h	m	s	s	"	"
0	13	33	8.59	2.0028	-14 42 22.8	-10.334	0	15	14	40.73	2.2308	-21 31 59.0	-6.340
1	13	35	8.89	2.0072	14 52 41.1	10.275	1	15	16	54.72	2.2354	21 38 16.2	6.232
2	13	37	9.45	2.0116	15 2 55.8	10.215	2	15	19	8.98	2.2401	21 44 26.8	6.123
3	13	39	10.28	2.0160	15 13 6.9	10.153	3	15	21	23.53	2.2448	21 50 30.9	6.013
4	13	41	11.37	2.0205	15 23 14.2	10.091	4	15	23	38.35	2.2493	21 56 28.3	5.902
5	13	43	12.74	2.0250	15 33 17.8	10.028	5	15	25	53.44	2.2538	22 2 19.1	5.791
6	13	45	14.37	2.0294	15 43 17.5	9.963	6	15	28	8.81	2.2583	22 8 3.2	5.678
7	13	47	16.27	2.0340	15 53 13.4	9.898	7	15	30	24.44	2.2628	22 13 40.4	5.563
8	13	49	18.45	2.0386	16 3 5.3	9.832	8	15	32	40.34	2.2673	22 19 10.8	5.449
9	13	51	20.90	2.0432	16 12 53.2	9.764	9	15	34	56.51	2.2718	22 24 34.3	5.333
10	13	53	23.63	2.0478	16 22 37.0	9.696	10	15	37	12.95	2.2761	22 29 50.8	5.218
11	13	55	26.64	2.0524	16 32 16.7	9.627	11	15	39	29.64	2.2803	22 35 0.4	5.100
12	13	57	29.92	2.0571	16 41 52.2	9.557	12	15	41	46.59	2.2847	22 40 2.8	4.981
13	13	59	33.49	2.0618	16 51 23.5	9.485	13	15	44	3.80	2.2889	22 44 58.1	4.863
14	14	1	37.34	2.0665	17 0 50.4	9.413	14	15	46	21.26	2.2932	22 49 46.3	4.743
15	14	3	41.47	2.0712	17 10 13.0	9.339	15	15	48	38.98	2.2973	22 54 27.3	4.623
16	14	5	45.88	2.0760	17 19 31.1	9.265	16	15	50	56.94	2.3013	22 59 1.0	4.501
17	14	7	50.59	2.0808	17 28 44.8	9.189	17	15	53	15.14	2.3054	23 3 27.4	4.378
18	14	9	55.58	2.0855	17 37 53.8	9.113	18	15	55	33.59	2.3095	23 7 46.4	4.255
19	14	12	0.85	2.0903	17 46 58.3	9.035	19	15	57	52.28	2.3134	23 11 58.0	4.131
20	14	14	6.42	2.0952	17 55 58.0	8.956	20	16	0	11.20	2.3173	23 16 2.1	4.006
21	14	16	12.27	2.1000	18 4 53.0	8.877	21	16	2	30.35	2.3211	23 19 58.7	3.881
22	14	18	18.42	2.1048	18 13 43.2	8.797	22	16	4	49.73	2.3249	23 23 47.8	3.754
23	14	20	24.85	2.1097	-18 22 28.6	-8.715	23	16	7	9.34	2.3287	-23 27 29.2	-3.627
OCTOBER 17.							OCTOBER 19.						
	h	m	s	s	"	"		h	m	s	s	"	"
0	14	22	31.58	2.1146	-18 31 9.0	-8.632	0	16	9	29.17	2.3323	-23 31 3.0	-3.499
1	14	24	38.60	2.1194	18 39 44.4	8.548	1	16	11	49.22	2.3359	23 34 29.1	3.371
2	14	26	45.91	2.1243	18 48 14.8	8.463	2	16	14	9.48	2.3394	23 37 47.5	3.242
3	14	28	53.51	2.1292	18 56 40.0	8.378	3	16	16	29.95	2.3428	23 40 58.1	3.111
4	14	31	1.41	2.1341	19 5 0.1	8.291	4	16	18	50.62	2.3463	23 44 0.8	2.980
5	14	33	9.60	2.1389	19 13 14.9	8.203	5	16	21	11.51	2.3497	23 46 55.7	2.849
6	14	35	18.08	2.1438	19 21 24.4	8.114	6	16	23	32.58	2.3529	23 49 42.7	2.718
7	14	37	26.86	2.1488	19 29 28.6	8.024	7	16	25	53.86	2.3563	23 52 21.8	2.585
8	14	39	35.93	2.1537	19 37 27.3	7.933	8	16	28	15.33	2.3593	23 54 52.9	2.451
9	14	41	45.30	2.1586	19 45 20.5	7.841	9	16	30	36.98	2.3623	23 57 15.9	2.317
10	14	43	54.96	2.1634	19 53 8.2	7.748	10	16	32	58.81	2.3654	23 59 30.9	2.183
11	14	46	4.91	2.1683	20 0 50.3	7.654	11	16	35	20.83	2.3683	24 1 37.8	2.048
12	14	48	15.16	2.1733	20 8 26.7	7.559	12	16	37	43.01	2.3712	24 3 36.6	1.912
13	14	50	25.70	2.1781	20 15 57.4	7.463	13	16	40	5.37	2.3740	24 5 27.2	1.776
14	14	52	36.53	2.1829	20 23 22.3	7.366	14	16	42	27.89	2.3766	24 7 9.7	1.639
15	14	54	47.65	2.1878	20 30 41.3	7.268	15	16	44	50.56	2.3793	24 8 43.9	1.501
16	14	56	59.07	2.1927	20 37 54.4	7.168	16	16	47	13.40	2.3818	24 10 9.8	1.363
17	14	59	10.77	2.1974	20 45 1.5	7.068	17	16	49	36.38	2.3843	24 11 27.5	1.226
18	15	1	22.76	2.2023	20 52 2.6	6.968	18	16	51	59.51	2.3867	24 12 36.9	1.087
19	15	3	35.05	2.2071	20 58 57.6	6.865	19	16	54	22.78	2.3890	24 13 37.9	0.947
20	15	5	47.61	2.2118	21 5 46.4	6.762	20	16	56	46.19	2.3913	24 14 30.5	0.808
21	15	8	0.47	2.2167	21 12 29.0	6.658	21	16	59	9.73	2.3934	24 15 14.8	0.668
22	15	10	13.61	2.2213	21 19 5.4	6.553	22	17	1	33.40	2.3955	24 15 50.7	0.528
23	15	12	27.03	2.2260	21 25 35.4	6.447	23	17	3	57.19	2.3974	24 16 18.1	0.386
24	15	14	40.73	2.2308	-21 31 59.0	-6.340	24	17	6	21.09	2.3993	-24 16 37.0	-0.245

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
OCTOBER 20.									OCTOBER 22.								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	17	6	21.09	2.3993	-24	16	37.0	-0.245	0	19	2	8.44	2.3958	-21	43	50.7	+6.556
1	17	8	45.11	2.4012	24	16	47.5	-0.104	1	19	4	32.13	2.3940	21	37	13.3	6.690
2	17	11	9.23	2.4028	24	16	49.5	+0.038	2	19	6	55.72	2.3923	21	30	27.9	6.823
3	17	13	33.45	2.4045	24	16	42.9	0.180	3	19	9	19.20	2.3903	21	23	34.5	6.957
4	17	15	57.77	2.4062	24	16	27.9	0.323	4	19	11	42.56	2.3884	21	16	33.1	7.089
5	17	18	22.19	2.4076	24	16	4.2	0.465	5	19	14	5.81	2.3865	21	9	23.8	7.220
6	17	20	46.68	2.4089	24	15	32.1	0.608	6	19	16	28.94	2.3845	21	2	6.7	7.351
7	17	23	11.26	2.4103	24	14	51.3	0.751	7	19	18	51.95	2.3825	20	54	41.7	7.483
8	17	25	35.92	2.4115	24	14	2.0	0.894	8	19	21	14.84	2.3805	20	47	8.8	7.612
9	17	28	0.64	2.4127	24	13	4.0	1.038	9	19	23	37.61	2.3783	20	39	28.3	7.740
10	17	30	25.44	2.4138	24	11	57.5	1.181	10	19	26	0.24	2.3762	20	31	40.0	7.868
11	17	32	50.29	2.4147	24	10	42.3	1.325	11	19	28	32.75	2.3740	20	23	44.1	7.996
12	17	35	15.20	2.4156	24	9	18.5	1.468	12	19	30	45.12	2.3718	20	15	40.5	8.123
13	17	37	40.16	2.4164	24	7	46.1	1.613	13	19	33	7.36	2.3696	20	7	29.4	8.248
14	17	40	5.17	2.4172	24	6	5.0	1.758	14	19	35	29.47	2.3673	19	59	10.7	8.373
15	17	42	30.22	2.4178	24	4	15.2	1.901	15	19	37	51.44	2.3650	19	50	44.6	8.498
16	17	44	55.30	2.4183	24	2	16.9	2.044	16	19	40	13.27	2.3628	19	42	11.0	8.621
17	17	47	20.41	2.4188	24	0	9.9	2.189	17	19	42	34.97	2.3604	19	33	30.1	8.743
18	17	49	45.55	2.4192	23	57	54.2	2.333	18	19	44	56.52	2.3580	19	24	41.8	8.866
19	17	52	10.71	2.4194	23	55	29.9	2.478	19	19	47	17.93	2.3556	19	15	46.2	8.986
20	17	54	35.88	2.4197	23	52	56.9	2.622	20	19	49	39.19	2.3533	19	6	43.5	9.106
21	17	57	1.07	2.4198	23	50	15.3	2.765	21	19	52	0.32	2.3508	18	57	33.5	9.226
22	17	59	26.26	2.4198	23	47	25.1	2.909	22	19	54	21.29	2.3483	18	48	16.4	9.343
23	18	1	51.45	2.4198	-23	44	26.2	+3.053	23	19	56	42.12	2.3459	-18	38	52.3	+9.461
OCTOBER 21.									OCTOBER 23.								
0	18	4	16.64	2.4198	-23	41	18.7	+3.197	0	19	59	2.80	2.3434	-18	29	21.1	+9.578
1	18	6	41.82	2.4196	23	38	2.6	3.340	1	20	1	23.33	2.3410	18	19	43.0	9.693
2	18	9	6.99	2.4193	23	34	37.9	3.483	2	20	3	43.72	2.3386	18	9	58.0	9.807
3	18	11	32.14	2.4190	23	31	4.6	3.627	3	20	6	3.96	2.3360	18	0	6.2	9.921
4	18	13	57.27	2.4185	23	27	22.7	3.770	4	20	8	24.04	2.3335	17	50	7.5	10.033
5	18	16	22.36	2.4180	23	23	32.2	3.913	5	20	10	43.98	2.3310	17	40	2.2	10.144
6	18	18	47.43	2.4175	23	19	33.2	4.055	6	20	13	3.76	2.3285	17	29	50.2	10.255
7	18	21	12.46	2.4168	23	15	25.6	4.198	7	20	15	23.40	2.3260	17	19	31.6	10.365
8	18	23	37.45	2.4162	23	11	9.5	4.339	8	20	17	42.88	2.3234	17	9	6.4	10.473
9	18	26	2.40	2.4153	23	6	44.9	4.480	9	20	20	2.21	2.3210	16	58	34.8	10.580
10	18	28	27.29	2.4144	23	2	11.9	4.622	10	20	22	21.40	2.3185	16	47	56.8	10.687
11	18	30	52.13	2.4136	22	57	30.3	4.763	11	20	24	40.43	2.3159	16	37	12.4	10.793
12	18	33	16.92	2.4126	22	52	40.3	4.903	12	20	26	59.31	2.3135	16	26	21.7	10.897
13	18	35	41.64	2.4115	22	47	41.9	5.043	13	20	29	18.05	2.3110	16	15	24.8	11.000
14	18	38	6.30	2.4104	22	42	35.1	5.183	14	20	31	36.63	2.3086	16	4	21.7	11.102
15	18	40	30.89	2.4092	22	37	19.9	5.323	15	20	33	55.08	2.3062	15	53	12.6	11.203
16	18	42	55.40	2.4079	22	31	56.3	5.463	16	20	36	13.37	2.3037	15	41	57.4	11.303
17	18	45	19.84	2.4067	22	26	24.4	5.600	17	20	38	31.52	2.3013	15	30	36.3	11.401
18	18	47	44.20	2.4053	22	20	44.3	5.738	18	20	40	49.52	2.2988	15	19	9.3	11.499
19	18	50	8.47	2.4038	22	14	55.8	5.877	19	20	43	7.38	2.2965	15	7	36.4	11.596
20	18	52	32.65	2.4023	22	8	59.1	6.013	20	20	45	25.10	2.2942	14	55	57.8	11.691
21	18	54	56.75	2.4008	22	2	54.3	6.149	21	20	47	42.68	2.2918	14	44	13.5	11.785
22	18	57	20.74	2.3991	21	56	41.2	6.286	22	20	50	0.11	2.2894	14	32	23.6	11.878
23	18	59	44.64	2.3975	21	50	20.0	6.421	23	20	52	17.41	2.2872	14	20	28.1	11.971
24	19	2	8.44	2.3958	-21	43	50.7	+6.556	24	20	54	34.57	2.2848	-14	8	27.1	+12.064

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 24.					OCTOBER 26.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	20 54 34.57	2.2848	-14 8 27.1	+12.062	0	22 42 20.73	2.2242	-3 9 7.7	+14.885
1	20 56 51.59	2.2826	13 56 20.7	12.151	1	22 44 34.18	2.2242	2 54 13.9	14.908
2	20 59 8.48	2.2804	13 44 9.0	12.239	2	22 46 47.63	2.2243	2 39 18.7	14.932
3	21 1 25.24	2.2783	13 31 52.0	12.327	3	22 49 1.09	2.2244	2 24 22.1	14.953
4	21 3 41.87	2.2760	13 19 29.8	12.413	4	22 51 14.56	2.2246	2 9 24.4	14.971
5	21 5 58.36	2.2738	13 7 2.4	12.498	5	22 53 28.04	2.2249	1 54 25.6	14.989
6	21 8 14.73	2.2718	12 54 30.1	12.581	6	22 55 41.55	2.2253	1 39 25.7	15.006
7	21 10 30.98	2.2698	12 41 52.7	12.664	7	22 57 55.08	2.2257	1 24 24.9	15.020
8	21 12 47.10	2.2677	12 29 10.4	12.745	8	23 0 8.63	2.2261	1 9 23.3	15.033
9	21 15 3.10	2.2657	12 16 23.3	12.824	9	23 2 22.21	2.2267	0 54 21.0	15.044
10	21 17 18.98	2.2637	12 3 31.5	12.903	10	23 4 35.83	2.2273	0 39 18.0	15.054
11	21 19 34.74	2.2618	11 50 34.9	12.981	11	23 6 49.48	2.2279	0 24 14.5	15.063
12	21 21 50.39	2.2599	11 37 33.8	13.057	12	23 9 3.18	2.2287	-0 9 10.5	15.069
13	21 24 5.93	2.2580	11 24 28.1	13.132	13	23 11 16.92	2.2294	+0 5 53.8	15.074
14	21 26 21.35	2.2562	11 11 18.0	13.205	14	23 13 30.71	2.2303	0 20 58.4	15.078
15	21 28 36.67	2.2544	10 58 3.5	13.277	15	23 15 44.55	2.2312	0 36 3.1	15.079
16	21 30 51.88	2.2527	10 44 44.8	13.348	16	23 17 58.45	2.2321	0 51 7.9	15.080
17	21 33 6.99	2.2511	10 31 21.8	13.418	17	23 20 12.40	2.2331	1 6 12.7	15.078
18	21 35 22.01	2.2494	10 17 54.7	13.486	18	23 22 26.42	2.2343	1 21 17.3	15.076
19	21 37 36.92	2.2478	10 4 23.5	13.553	19	23 24 40.51	2.2353	1 36 21.8	15.072
20	21 39 51.74	2.2463	9 50 48.4	13.618	20	23 26 54.66	2.2365	1 51 25.9	15.064
21	21 42 6.47	2.2448	9 37 9.4	13.683	21	23 29 8.89	2.2378	2 6 29.5	15.057
22	21 44 21.11	2.2433	9 23 26.5	13.746	22	23 31 23.20	2.2391	2 21 32.7	15.048
23	21 46 35.66	2.2418	-9 9 39.9	+13.807	23	23 33 37.58	2.2404	+2 36 35.3	+15.037
OCTOBER 25.					OCTOBER 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 48 50.13	2.2405	-8 55 49.7	+13.867	0	23 35 52.05	2.2419	+2 51 37.1	+15.023
1	21 51 4.52	2.2392	8 41 55.9	13.926	1	23 38 6.61	2.2433	3 6 38.1	15.009
2	21 53 18.83	2.2379	8 27 58.6	13.983	2	23 40 21.25	2.2448	3 21 38.2	14.993
3	21 55 33.07	2.2368	8 13 57.9	14.039	3	23 42 35.99	2.2465	3 36 37.3	14.976
4	21 57 47.24	2.2356	7 59 53.9	14.093	4	23 44 50.83	2.2482	3 51 35.3	14.957
5	22 0 1.34	2.2344	7 45 46.7	14.147	5	23 47 5.77	2.2498	4 6 32.1	14.936
6	22 2 15.37	2.2333	7 31 36.3	14.199	6	23 49 20.81	2.2516	4 21 27.6	14.913
7	22 4 29.34	2.2324	7 17 22.8	14.250	7	23 51 35.96	2.2533	4 36 21.6	14.888
8	22 6 43.26	2.2315	7 3 6.3	14.298	8	23 53 51.21	2.2553	4 51 14.1	14.863
9	22 8 57.12	2.2306	6 48 47.0	14.346	9	23 56 6.59	2.2573	5 6 5.1	14.835
10	22 11 10.93	2.2298	6 34 24.8	14.393	10	23 58 22.08	2.2592	5 20 54.3	14.805
11	22 13 24.69	2.2289	6 19 59.9	14.438	11	0 0 37.69	2.2612	5 35 41.7	14.774
12	22 15 38.40	2.2282	6 5 32.3	14.481	12	0 2 53.42	2.2633	5 50 27.2	14.742
13	22 17 52.07	2.2276	5 51 2.2	14.523	13	0 5 9.28	2.2654	6 5 10.7	14.707
14	22 20 5.71	2.2270	5 36 29.6	14.563	14	0 7 25.27	2.2676	6 19 52.0	14.670
15	22 22 19.31	2.2264	5 21 54.7	14.601	15	0 9 41.39	2.2698	6 34 31.1	14.633
16	22 24 32.88	2.2259	5 7 17.5	14.639	16	0 11 57.64	2.2720	6 49 8.0	14.593
17	22 26 46.42	2.2255	4 52 38.0	14.675	17	0 14 14.03	2.2743	7 3 42.3	14.552
18	22 28 59.94	2.2251	4 37 56.5	14.709	18	0 16 30.56	2.2768	7 18 14.2	14.510
19	22 31 13.43	2.2248	4 23 12.9	14.743	19	0 18 47.24	2.2792	7 32 43.5	14.465
20	22 33 26.91	2.2246	4 8 27.4	14.774	20	0 21 4.06	2.2816	7 47 10.0	14.419
21	22 35 40.38	2.2243	3 53 40.0	14.804	21	0 23 21.03	2.2842	8 1 33.8	14.372
22	22 37 53.83	2.2242	3 38 50.9	14.833	22	0 25 38.16	2.2867	8 15 54.6	14.322
23	22 40 7.28	2.2242	3 24 0.1	14.860	23	0 27 55.43	2.2892	8 30 12.4	14.270
24	22 42 20.73	2.2242	-3 9 7.7	+14.885	24	0 30 12.86	2.2918	+8 44 27.0	+14.217



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
OCTOBER 28.					OCTOBER 30.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	0 30 12.86	2.2918	+ 8 44 27.0	+14.217	0	2 23 39.49	2.4358	+18 35 7.4	+9.812
1	0 32 30.45	2.2945	8 58 38.4	14.163	1	2 26 5.72	2.4384	18 44 52.3	9.686
2	0 34 48.20	2.2972	9 12 46.5	14.107	2	2 28 32.10	2.4410	18 54 29.7	9.558
3	0 37 6.11	2.2999	9 26 51.2	14.049	3	2 30 58.64	2.4437	19 3 59.3	9.430
4	0 39 24.19	2.3027	9 40 52.4	13.989	4	2 33 25.34	2.4462	19 13 21.3	9.300
5	0 41 42.43	2.3054	9 54 49.9	13.928	5	2 35 52.18	2.4486	19 22 35.3	9.169
6	0 44 0.84	2.3083	10 8 43.7	13.864	6	2 38 19.17	2.4511	19 31 41.6	9.038
7	0 46 19.42	2.3112	10 22 33.6	13.800	7	2 40 46.31	2.4534	19 40 39.8	8.904
8	0 48 38.18	2.3141	10 36 19.7	13.734	8	2 43 13.58	2.4557	19 49 30.1	8.771
9	0 50 57.11	2.3170	10 50 1.7	13.666	9	2 45 40.99	2.4579	19 58 12.3	8.637
10	0 53 16.22	2.3199	11 3 39.6	13.597	10	2 48 8.53	2.4601	20 6 46.5	8.501
11	0 55 35.50	2.3228	11 17 13.3	13.525	11	2 50 36.20	2.4623	20 15 12.4	8.363
12	0 57 54.96	2.3258	11 30 42.6	13.452	12	2 53 4.00	2.4643	20 23 30.1	8.226
13	1 0 14.60	2.3289	11 44 7.5	13.378	13	2 55 31.92	2.4663	20 31 39.5	8.088
14	1 2 34.43	2.3320	11 57 27.9	13.301	14	2 57 59.95	2.4682	20 39 40.6	7.948
15	1 4 54.44	2.3350	12 10 43.6	13.223	15	3 0 28.10	2.4700	20 47 33.2	7.808
16	1 7 14.63	2.3381	12 23 54.7	13.144	16	3 2 56.35	2.4718	20 55 17.5	7.667
17	1 9 35.01	2.3413	12 37 0.9	13.063	17	3 5 24.71	2.4735	21 2 53.2	7.524
18	1 11 55.58	2.3443	12 50 2.2	12.981	18	3 7 53.17	2.4751	21 10 20.4	7.383
19	1 14 16.33	2.3474	13 2 58.6	12.897	19	3 10 21.72	2.4767	21 17 39.1	7.239
20	1 16 37.27	2.3505	13 15 49.8	12.811	20	3 12 50.37	2.4782	21 24 49.1	7.094
21	1 18 58.39	2.3537	13 28 35.9	12.723	21	3 15 19.10	2.4794	21 31 50.4	6.950
22	1 21 19.71	2.3568	13 41 16.6	12.634	22	3 17 47.90	2.4808	21 38 43.1	6.805
23	1 23 41.21	2.3599	+13 53 52.0	+12.544	23	3 20 16.79	2.4820	+21 45 27.0	+6.658
OCTOBER 29.					OCTOBER 31.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	1 26 2.90	2.3632	+14 6 21.9	+12.453	0	3 22 45.74	2.4831	+21 52 2.1	+6.512
1	1 28 24.79	2.3663	14 18 46.3	12.358	1	3 25 14.76	2.4842	21 58 28.4	6.365
2	1 30 46.86	2.3695	14 31 4.9	12.263	2	3 27 43.84	2.4851	22 4 45.9	6.218
3	1 33 9.13	2.3727	14 43 17.9	12.167	3	3 30 12.97	2.4859	22 10 54.5	6.068
4	1 35 31.58	2.3758	14 55 25.0	12.068	4	3 32 42.15	2.4868	22 16 54.1	5.919
5	1 37 54.22	2.3790	15 7 26.1	11.968	5	3 35 11.38	2.4874	22 22 44.8	5.771
6	1 40 17.06	2.3822	15 19 21.2	11.868	6	3 37 40.64	2.4880	22 28 26.6	5.621
7	1 42 40.08	2.3853	15 31 10.3	11.766	7	3 40 9.94	2.4885	22 33 59.3	5.471
8	1 45 3.30	2.3885	15 42 53.1	11.661	8	3 42 39.26	2.4888	22 39 23.1	5.321
9	1 47 26.70	2.3916	15 54 29.6	11.556	9	3 45 8.60	2.4892	22 44 37.8	5.170
10	1 49 50.29	2.3947	16 5 59.8	11.449	10	3 47 37.96	2.4894	22 49 43.5	5.018
11	1 52 14.06	2.3978	16 17 23.5	11.341	11	3 50 7.33	2.4895	22 54 40.0	4.867
12	1 54 38.02	2.4009	16 28 40.7	11.232	12	3 52 36.70	2.4895	22 59 27.5	4.716
13	1 57 2.17	2.4039	16 39 51.3	11.120	13	3 55 6.07	2.4894	23 4 5.9	4.563
14	1 59 26.49	2.4069	16 50 55.1	11.008	14	3 57 35.43	2.4892	23 8 35.1	4.411
15	2 1 51.00	2.4100	17 1 52.2	10.894	15	4 0 4.77	2.4889	23 12 55.2	4.259
16	2 4 15.69	2.4130	17 12 42.4	10.778	16	4 2 34.10	2.4886	23 17 6.2	4.107
17	2 6 40.56	2.4160	17 23 25.6	10.662	17	4 5 3.40	2.4880	23 21 8.0	3.954
18	2 9 5.61	2.4189	17 34 1.8	10.544	18	4 7 32.66	2.4873	23 25 0.7	3.802
19	2 11 30.83	2.4218	17 44 30.9	10.426	19	4 10 1.88	2.4867	23 28 44.2	3.649
20	2 13 56.22	2.4247	17 54 52.9	10.306	20	4 12 31.06	2.4858	23 32 18.6	3.496
21	2 16 21.79	2.4275	18 5 7.6	10.183	21	4 15 0.18	2.4849	23 35 43.7	3.343
22	2 18 47.52	2.4303	18 15 14.9	10.061	22	4 17 29.25	2.4840	23 38 59.8	3.191
23	2 21 13.42	2.4331	18 25 14.9	9.938	23	4 19 58.26	2.4828	23 42 6.6	3.038
24	2 23 39.49	2.4358	+18 35 7.4	+9.812	24	4 22 27.19	2.4816	+23 45 4.3	+2.888



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 1.					NOVEMBER 3.				
	<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>"</i>		<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>"</i>
0	4 22 27.19	2.4816	+23 45 4.3	+2.885	0	6 18 19.43	2.3148	+23 15 6.9	-3.887
1	4 24 56.05	2.4803	23 47 52.8	2.733	1	6 20 38.16	2.3096	23 11 10.0	4.008
2	4 27 24.82	2.4788	23 50 32.2	2.581	2	6 22 56.58	2.3043	23 7 5.9	4.129
3	4 29 53.50	2.4773	23 53 2.5	2.428	3	6 25 14.68	2.2991	23 2 54.5	4.250
4	4 32 22.09	2.4757	23 55 23.6	2.276	4	6 27 32.47	2.2938	22 58 35.9	4.369
5	4 34 50.58	2.4739	23 57 35.6	2.124	5	6 29 49.94	2.2884	22 54 10.2	4.487
6	4 37 18.96	2.4720	23 59 38.5	1.973	6	6 32 7.08	2.2831	22 49 37.5	4.604
7	4 39 47.22	2.4701	24 1 32.3	1.822	7	6 34 23.91	2.2778	22 44 57.7	4.720
8	4 42 15.37	2.4681	24 3 17.1	1.671	8	6 36 40.41	2.2723	22 40 11.1	4.835
9	4 44 43.39	2.4658	24 4 52.8	1.520	9	6 38 56.59	2.2669	22 35 17.5	4.950
10	4 47 11.27	2.4636	24 6 19.5	1.369	10	6 41 12.44	2.2614	22 30 17.1	5.063
11	4 49 39.02	2.4613	24 7 37.1	1.219	11	6 43 27.96	2.2559	22 25 10.0	5.174
12	4 52 6.63	2.4588	24 8 45.8	1.070	12	6 45 43.15	2.2504	22 19 56.2	5.285
13	4 54 34.08	2.4563	24 9 45.5	0.921	13	6 47 58.01	2.2449	22 14 35.8	5.395
14	4 57 1.38	2.4537	24 10 36.3	0.772	14	6 50 12.54	2.2393	22 9 8.8	5.504
15	4 59 28.52	2.4509	24 11 18.1	0.623	15	6 52 26.73	2.2338	22 3 35.3	5.612
16	5 1 55.49	2.4480	24 11 51.1	0.476	16	6 54 40.59	2.2283	21 57 55.4	5.718
17	5 4 22.28	2.4451	24 12 15.2	0.328	17	6 56 54.12	2.2227	21 52 9.1	5.825
18	5 6 48.90	2.4421	24 12 30.5	0.182	18	6 59 7.31	2.2171	21 46 16.4	5.929
19	5 9 15.33	2.4389	24 12 37.0	+0.036	19	7 1 20.17	2.2114	21 40 17.6	6.033
20	5 11 41.57	2.4357	24 12 34.8	-0.110	20	7 3 32.68	2.2058	21 34 12.5	6.136
21	5 14 7.61	2.4324	24 12 23.8	0.256	21	7 5 44.87	2.2003	21 28 1.3	6.237
22	5 16 33.46	2.4290	24 12 4.1	0.400	22	7 7 56.71	2.1946	21 21 44.1	6.338
23	5 18 59.09	2.4255	+24 11 35.8	-0.543	23	7 10 8.22	2.1890	+21 15 20.8	-6.438
NOVEMBER 2.					NOVEMBER 4.				
	<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>"</i>		<i>h m s</i>	<i>s</i>	<i>° ' "</i>	<i>"</i>
0	5 21 24.52	2.4220	+24 10 58.9	-0.687	0	7 12 19.39	2.1833	+21 8 51.6	-6.536
1	5 23 49.73	2.4183	24 10 13.4	0.829	1	7 14 30.22	2.1778	21 2 16.5	6.633
2	5 26 14.72	2.4146	24 9 19.4	0.971	2	7 16 40.72	2.1722	20 55 35.7	6.729
3	5 28 39.48	2.4108	24 8 16.9	1.113	3	7 18 50.88	2.1666	20 48 49.0	6.825
4	5 31 4.01	2.4069	24 7 5.9	1.253	4	7 21 0.71	2.1610	20 41 56.7	6.919
5	5 33 28.31	2.4029	24 5 46.5	1.393	5	7 23 10.20	2.1553	20 34 58.7	7.013
6	5 35 52.36	2.3988	24 4 18.8	1.531	6	7 25 19.35	2.1498	20 27 55.2	7.104
7	5 38 16.17	2.3948	24 2 42.8	1.669	7	7 27 28.17	2.1443	20 20 46.2	7.195
8	5 40 39.73	2.3905	24 0 58.5	1.808	8	7 29 36.66	2.1387	20 13 31.8	7.286
9	5 43 3.03	2.3862	23 59 5.9	1.944	9	7 31 44.81	2.1331	20 6 11.9	7.375
10	5 45 26.07	2.3818	23 57 5.2	2.079	10	7 33 52.63	2.1276	19 58 46.8	7.463
11	5 47 48.85	2.3775	23 54 56.4	2.214	11	7 36 0.12	2.1221	19 51 16.3	7.551
12	5 50 11.37	2.3731	23 52 39.5	2.348	12	7 38 7.28	2.1166	19 43 40.7	7.637
13	5 52 33.62	2.3685	23 50 14.6	2.482	13	7 40 14.11	2.1111	19 35 59.9	7.722
14	5 54 55.59	2.3638	23 47 41.7	2.613	14	7 42 20.61	2.1057	19 28 14.1	7.806
15	5 57 17.28	2.3592	23 45 1.0	2.745	15	7 44 26.79	2.1003	19 20 23.2	7.889
16	5 59 38.69	2.3545	23 42 12.3	2.876	16	7 46 32.64	2.0948	19 12 27.4	7.972
17	6 1 59.82	2.3497	23 39 15.9	3.005	17	7 48 38.17	2.0895	19 4 26.6	8.053
18	6 4 20.65	2.3448	23 36 11.7	3.134	18	7 50 43.38	2.0841	18 56 21.0	8.133
19	6 6 41.20	2.3400	23 32 59.8	3.262	19	7 52 48.26	2.0788	18 48 10.6	8.213
20	6 9 1.45	2.3350	23 29 40.3	3.388	20	7 54 52.83	2.0735	18 39 55.5	8.290
21	6 11 21.40	2.3300	23 26 13.2	3.515	21	7 56 57.08	2.0683	18 31 35.8	8.368
22	6 13 41.05	2.3249	23 22 38.5	3.640	22	7 59 1.02	2.0631	18 23 11.4	8.445
23	6 16 0.39	2.3198	23 18 56.4	3.763	23	8 1 4.65	2.0578	18 14 42.4	8.520
24	6 18 19.43	2.3148	+23 15 6.9	-3.887	24	8 3 7.96	2.0527	+18 6 9.0	-8.594

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
NOVEMBER 5.									NOVEMBER 7.								
	h	m	s	s	"	"	"			h	m	s	s	"	"	"	
0	8	3	7.96	2.0527	+18	6	9.0	-8.594	0	9	36	32.68	1.8593	+10	4	21.1	-11.173
1	8	5	10.97	2.0475		17	57 31.1	8.668	1	9	38	24.16	1.8567		9	53 9.6	11.208
2	8	7	13.66	2.0424		17	48 48.9	8.740	2	9	40	15.48	1.8541		9	41 56.1	11.243
3	8	9	16.06	2.0374		17	40 2.3	8.813	3	9	42	6.65	1.8516		9	30 40.5	11.277
4	8	11	18.15	2.0323		17	31 11.4	8.883	4	9	43	57.67	1.8491		9	19 22.9	11.310
5	8	13	19.94	2.0274		17	22 16.3	8.953	5	9	45	48.54	1.8466		9	8 3.3	11.343
6	8	15	21.44	2.0224		17	13 17.1	9.022	6	9	47	39.26	1.8443		8	56 41.7	11.375
7	8	17	22.63	2.0175		17	4 13.7	9.090	7	9	49	29.85	1.8420		8	45 18.3	11.406
8	8	19	23.54	2.0127		16	55 6.3	9.157	8	9	51	20.30	1.8398		8	33 53.0	11.437
9	8	21	24.15	2.0078		16	45 54.9	9.223	9	9	53	10.62	1.8375		8	22 25.9	11.467
10	8	23	24.48	2.0031		16	36 39.5	9.288	10	9	55	0.80	1.8354		8	10 57.0	11.497
11	8	25	24.52	1.9983		16	27 20.3	9.353	11	9	56	50.87	1.8334		7	59 26.3	11.525
12	8	27	24.28	1.9937		16	17 57.2	9.417	12	9	58	40.81	1.8314		7	47 54.0	11.553
13	8	29	23.76	1.9890		16	8 30.3	9.479	13	10	0	30.64	1.8295		7	36 20.0	11.580
14	8	31	22.96	1.9844		15	58 59.7	9.542	14	10	2	20.35	1.8276		7	24 44.4	11.607
15	8	33	21.89	1.9798		15	49 25.3	9.603	15	10	4	9.95	1.8258		7	13 7.2	11.633
16	8	35	20.54	1.9753		15	39 47.4	9.663	16	10	5	59.45	1.8241		7	1 28.5	11.658
17	8	37	18.93	1.9709		15	30 5.8	9.723	17	10	7	48.84	1.8224		6	49 48.2	11.684
18	8	39	17.05	1.9665		15	20 20.7	9.780	18	10	9	38.14	1.8208		6	38 6.4	11.708
19	8	41	14.91	1.9621		15	10 32.2	9.838	19	10	11	27.34	1.8193		6	26 23.3	11.731
20	8	43	12.50	1.9578		15	0 40.2	9.895	20	10	13	16.45	1.8178		6	14 38.7	11.755
21	8	45	9.84	1.9536		14	50 44.8	9.952	21	10	15	5.47	1.8163		6	2 52.7	11.777
22	8	47	6.93	1.9493		14	40 46.0	10.007	22	10	16	54.41	1.8150		5	51 5.5	11.798
23	8	49	3.76	1.9452		+14	30 44.0	-10.060	23	10	18	43.27	1.8138		+ 5	39 16.9	-11.820
NOVEMBER 6.									NOVEMBER 8.								
	h	m	s	s	"	"	"			h	m	s	s	"	"	"	
0	8	51	0.35	1.9411	+14	20 38.8	-10.113	0	10	20	32.06	1.8126	+ 5	27 27.1	-11.840		
1	8	52	56.69	1.9370		14	10 30.4	10.167	1	10	22	20.78	1.8113		5	15 36.1	11.860
2	8	54	52.79	1.9331		14	0 18.8	10.219	2	10	24	9.42	1.8102		5	3 43.9	11.879
3	8	56	48.66	1.9292		13	50 4.1	10.270	3	10	25	58.00	1.8093		4	51 50.6	11.898
4	8	58	44.29	1.9252		13	39 46.4	10.320	4	10	27	46.53	1.8083		4	39 56.2	11.916
5	9	0	39.68	1.9213		13	29 25.7	10.370	5	10	29	34.99	1.8073		4	28 0.7	11.933
6	9	2	34.85	1.9177		13	19 2.0	10.419	6	10	31	23.40	1.8065		4	16 4.2	11.950
7	9	4	29.80	1.9139		13	8 35.4	10.468	7	10	33	11.77	1.8058		4	4 6.7	11.966
8	9	6	24.52	1.9102		12	58 5.9	10.515	8	10	35	0.09	1.8049		3	52 8.3	11.982
9	9	8	19.02	1.9066		12	47 33.6	10.561	9	10	36	48.36	1.8043		3	40 8.9	11.998
10	9	10	13.31	1.9030		12	36 58.6	10.607	10	10	38	36.60	1.8038		3	28 8.6	12.012
11	9	12	7.38	1.8995		12	26 20.8	10.653	11	10	40	24.81	1.8033		3	16 7.5	12.025
12	9	14	1.25	1.8961		12	15 40.3	10.697	12	10	42	12.99	1.8028		3	4 5.6	12.038
13	9	15	54.91	1.8927		12	4 57.2	10.740	13	10	44	1.15	1.8024		2	52 2.9	12.051
14	9	17	48.37	1.8894		11	54 11.5	10.783	14	10	45	49.28	1.8020		2	39 59.5	12.063
15	9	19	41.64	1.8861		11	43 23.3	10.825	15	10	47	37.39	1.8018		2	27 55.4	12.074
16	9	21	34.70	1.8828		11	32 32.5	10.867	16	10	49	25.49	1.8016		2	15 50.6	12.085
17	9	23	27.58	1.8798		11	21 39.3	10.908	17	10	51	13.58	1.8014		2	3 45.2	12.095
18	9	25	20.27	1.8767		11	10 43.6	10.948	18	10	53	1.66	1.8014		1	51 39.2	12.105
19	9	27	12.78	1.8736		10	59 45.6	10.987	19	10	54	49.75	1.8014		1	39 32.6	12.114
20	9	29	5.10	1.8706		10	48 45.2	11.026	20	10	56	37.83	1.8013		1	27 25.5	12.122
21	9	30	57.25	1.8678		10	37 42.5	11.063	21	10	58	25.91	1.8015		1	15 18.0	12.129
22	9	32	49.23	1.8649		10	26 37.6	11.101	22	11	0	14.01	1.8017		1	3 10.0	12.137
23	9	34	41.04	1.8621		10	15 30.4	11.138	23	11	2	2.11	1.8019		0	51 1.6	12.143
24	9	36	32.68	1.8593		+10	4 21.1	-11.173	24	11	3	50.24	1.8023		+ 0	38 52.8	-12.150



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 9.					NOVEMBER 11.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 3 50.24	1.8023	+0 38 52.8	-12.149	0	12 31 54.09	1.8908	-8 58 27.0	-11.635
1	11 5 38.39	1.8027	0 26 43.7	12.154	1	12 33 47.63	1.8940	9 10 4.3	11.606
2	11 7 26.56	1.8031	0 14 34.3	12.158	2	12 35 41.37	1.8974	9 21 39.7	11.576
3	11 9 14.76	1.8036	+0 2 24.7	12.163	3	12 37 35.32	1.9008	9 33 13.4	11.546
4	11 11 2.99	1.8042	-0 9 45.2	12.166	4	12 39 29.47	1.9043	9 44 45.2	11.514
5	11 12 51.26	1.8048	0 21 55.2	12.168	5	12 41 23.84	1.9079	9 56 15.1	11.482
6	11 14 39.56	1.8054	0 34 5.4	12.171	6	12 43 18.42	1.9114	10 7 43.0	11.448
7	11 16 27.91	1.8063	0 46 15.7	12.172	7	12 45 13.21	1.9150	10 19 8.9	11.415
8	11 18 16.31	1.8071	0 58 26.0	12.173	8	12 47 8.22	1.9188	10 30 32.8	11.380
9	11 20 4.76	1.8079	1 10 36.4	12.173	9	12 49 3.46	1.9225	10 41 54.5	11.343
10	11 21 53.26	1.8088	1 22 46.8	12.173	10	12 50 58.92	1.9263	10 53 14.0	11.307
11	11 23 41.82	1.8099	1 34 57.1	12.171	11	12 52 54.62	1.9302	11 4 31.3	11.269
12	11 25 30.45	1.8110	1 47 7.3	12.169	12	12 54 50.54	1.9340	11 15 46.3	11.231
13	11 27 19.14	1.8121	1 59 17.4	12.167	13	12 56 46.70	1.9380	11 26 59.0	11.192
14	11 29 7.90	1.8133	2 11 27.3	12.163	14	12 58 43.10	1.9420	11 38 9.3	11.151
15	11 30 56.74	1.8146	2 23 37.0	12.160	15	13 0 39.74	1.9460	11 49 17.1	11.109
16	11 32 45.65	1.8159	2 35 46.5	12.155	16	13 2 36.62	1.9502	12 0 22.4	11.067
17	11 34 34.65	1.8173	2 47 55.6	12.150	17	13 4 33.76	1.9543	12 11 25.1	11.024
18	11 36 23.73	1.8187	3 0 4.5	12.145	18	13 6 31.14	1.9585	12 22 25.3	10.981
19	11 38 12.89	1.8202	3 12 13.0	12.138	19	13 8 28.78	1.9628	12 33 22.8	10.935
20	11 40 2.15	1.8218	3 24 21.0	12.131	20	13 10 26.67	1.9670	12 44 17.5	10.889
21	11 41 51.51	1.8235	3 36 28.7	12.123	21	13 12 24.82	1.9714	12 55 9.5	10.843
22	11 43 40.97	1.8252	3 48 35.8	12.114	22	13 14 23.24	1.9758	13 5 58.6	10.794
23	11 45 30.53	1.8269	-4 0 42.4	-12.105	23	13 16 21.92	1.9802	-13 16 44.8	-10.745
NOVEMBER 10.					NOVEMBER 12.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	11 47 20.20	1.8288	-4 12 48.4	-12.095	0	13 18 20.86	1.9846	-13 27 28.0	-10.695
1	11 49 9.98	1.8307	4 24 53.8	12.085	1	13 20 20.07	1.9892	13 38 8.2	10.644
2	11 50 59.88	1.8326	4 36 58.6	12.073	2	13 22 19.56	1.9938	13 48 45.3	10.593
3	11 52 49.89	1.8346	4 49 2.6	12.061	3	13 24 19.32	1.9983	13 59 19.3	10.540
4	11 54 40.03	1.8368	5 1 5.9	12.048	4	13 26 19.36	2.0029	14 9 50.1	10.486
5	11 56 30.30	1.8388	5 13 8.4	12.035	5	13 28 19.67	2.0076	14 20 17.6	10.431
6	11 58 20.69	1.8410	5 25 10.1	12.021	6	13 30 20.27	2.0124	14 30 41.8	10.375
7	12 0 11.22	1.8433	5 37 10.9	12.006	7	13 32 21.16	2.0172	14 41 2.6	10.318
8	12 2 1.88	1.8456	5 49 10.8	11.990	8	13 34 22.33	2.0219	14 51 20.0	10.260
9	12 3 52.69	1.8479	6 1 9.7	11.973	9	13 36 23.79	2.0267	15 1 33.8	10.201
10	12 5 43.63	1.8503	6 13 7.6	11.957	10	13 38 25.53	2.0315	15 11 44.1	10.141
11	12 7 34.73	1.8529	6 25 4.5	11.938	11	13 40 27.57	2.0365	15 21 50.7	10.080
12	12 9 25.98	1.8555	6 37 0.2	11.919	12	13 42 29.91	2.0414	15 31 53.7	10.018
13	12 11 17.39	1.8581	6 48 54.8	11.901	13	13 44 32.54	2.0464	15 41 52.9	9.955
14	12 13 8.95	1.8607	7 0 48.3	11.881	14	13 46 35.48	2.0514	15 51 48.3	9.891
15	12 15 0.67	1.8635	7 12 40.5	11.859	15	13 48 38.71	2.0564	16 1 39.8	9.825
16	12 16 52.57	1.8663	7 24 31.4	11.838	16	13 50 42.25	2.0615	16 11 27.3	9.758
17	12 18 44.63	1.8691	7 36 21.0	11.816	17	13 52 46.09	2.0665	16 21 10.8	9.692
18	12 20 36.86	1.8720	7 48 9.3	11.793	18	13 54 50.23	2.0717	16 30 50.3	9.623
19	12 22 29.27	1.8750	7 59 56.1	11.768	19	13 56 54.69	2.0768	16 40 25.6	9.553
20	12 24 21.86	1.8780	8 11 41.4	11.743	20	13 58 59.45	2.0819	16 49 56.7	9.483
21	12 26 14.63	1.8811	8 23 25.2	11.717	21	14 1 4.52	2.0871	16 59 23.5	9.411
22	12 28 7.59	1.8843	8 35 7.4	11.691	22	14 3 9.90	2.0923	17 8 46.0	9.338
23	12 30 0.74	1.8875	8 46 48.1	11.663	23	14 5 15.60	2.0976	17 18 4.1	9.264
24	12 31 54.09	1.8908	-8 58 27.0	-11.635	24	14 7 21.61	2.1028	-17 27 17.7	-9.189

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.			Var. per Min.
NOVEMBER 13.									NOVEMBER 15.								
	h	m	s	s	°	'	"	"		h	m	s	s	°	'	"	"
0	14	7	21.61	2.1028	-17	27	17.7	-9.189	0	15	54	20.73	2.3470	-23	0	46.1	-4.290
1	14	9	27.94	2.1081	17	36	26.8	9.113	1	15	56	41.68	2.3512	23	4	59.7	4.163
2	14	11	34.58	2.1133	17	45	31.2	9.035	2	15	59	2.87	2.3553	23	9	5.7	4.035
3	14	13	41.54	2.1187	17	54	31.0	8.958	3	16	1	24.32	2.3594	23	13	3.9	3.906
4	14	15	48.82	2.1240	18	3	26.1	8.878	4	16	3	46.00	2.3634	23	16	54.4	3.777
5	14	17	56.42	2.1293	18	12	16.3	8.797	5	16	6	7.93	2.3674	23	20	37.1	3.646
6	14	20	4.34	2.1347	18	21	1.7	8.715	6	16	8	30.09	2.3712	23	24	11.9	3.513
7	14	22	12.58	2.1400	18	29	42.1	8.633	7	16	10	52.47	2.3749	23	27	38.7	3.382
8	14	24	21.14	2.1453	18	38	17.6	8.548	8	16	13	15.08	2.3788	23	30	57.7	3.249
9	14	26	30.02	2.1507	18	46	47.9	8.463	9	16	15	37.92	2.3823	23	34	8.6	3.114
10	14	28	39.22	2.1560	18	55	13.1	8.378	10	16	18	0.96	2.3858	23	37	11.4	2.980
11	14	30	48.74	2.1614	19	3	33.2	8.290	11	16	20	24.22	2.3893	23	40	6.2	2.845
12	14	32	58.59	2.1668	19	11	47.9	8.201	12	16	22	47.68	2.3928	23	42	52.8	2.709
13	14	35	8.76	2.1722	19	19	57.3	8.112	13	16	25	11.35	2.3961	23	45	31.3	2.573
14	14	37	19.25	2.1775	19	28	1.3	8.022	14	16	27	35.21	2.3993	23	48	1.5	2.434
15	14	39	30.06	2.1829	19	35	59.9	7.929	15	16	29	59.26	2.4023	23	50	23.4	2.297
16	14	41	41.20	2.1883	19	43	52.8	7.836	16	16	32	23.49	2.4054	23	52	37.1	2.158
17	14	43	52.65	2.1936	19	51	40.2	7.743	17	16	34	47.91	2.4084	23	54	42.4	2.019
18	14	46	4.43	2.1990	19	59	21.9	7.647	18	16	37	12.50	2.4113	23	56	39.4	1.879
19	14	48	16.53	2.2043	20	6	57.8	7.550	19	16	39	37.27	2.4141	23	58	27.9	1.738
20	14	50	28.95	2.2096	20	14	27.9	7.453	20	16	42	2.19	2.4168	24	0	8.0	1.598
21	14	52	41.68	2.2149	20	21	52.2	7.355	21	16	44	27.28	2.4194	24	1	39.6	1.456
22	14	54	54.74	2.2203	20	29	10.5	7.254	22	16	46	52.52	2.4218	24	3	2.7	1.314
23	14	57	8.11	2.2255	-20	36	22.7	-7.153	23	16	49	17.90	2.4243	-24	4	17.3	-1.172
NOVEMBER 14.									NOVEMBER 16.								
0	14	59	21.80	2.2308	-20	43	28.9	-7.052	0	16	51	43.43	2.4266	-24	5	23.3	-1.028
1	15	1	35.81	2.2360	20	50	28.9	6.949	1	16	54	9.09	2.4288	24	6	20.7	0.885
2	15	3	50.12	2.2413	20	57	22.8	6.845	2	16	56	34.88	2.4309	24	7	9.5	0.742
3	15	6	4.76	2.2465	21	4	10.3	6.739	3	16	59	0.80	2.4330	24	7	49.7	0.597
4	15	8	19.70	2.2516	21	10	51.5	6.633	4	17	1	26.84	2.4348	24	8	21.1	0.452
5	15	10	34.95	2.2568	21	17	26.3	6.527	5	17	3	52.98	2.4367	24	8	43.9	0.308
6	15	12	50.51	2.2619	21	23	54.7	6.418	6	17	6	19.24	2.4384	24	8	58.0	0.163
7	15	15	6.38	2.2670	21	30	16.4	6.308	7	17	8	45.59	2.4400	24	9	3.4	-0.017
8	15	17	22.55	2.2721	21	36	31.6	6.198	8	17	11	12.04	2.4415	24	9	0.0	+0.130
9	15	19	39.03	2.2772	21	42	40.2	6.087	9	17	13	38.57	2.4429	24	8	47.8	0.276
10	15	21	55.81	2.2821	21	48	42.0	5.973	10	17	16	5.19	2.4443	24	8	26.9	0.422
11	15	24	12.88	2.2870	21	54	36.9	5.859	11	17	18	31.88	2.4454	24	7	57.2	0.568
12	15	26	30.25	2.2919	22	0	25.1	5.745	12	17	20	58.64	2.4466	24	7	18.7	0.715
13	15	28	47.91	2.2968	22	6	6.3	5.629	13	17	23	25.47	2.4476	24	6	31.4	0.862
14	15	31	5.87	2.3017	22	11	40.6	5.513	14	17	25	52.35	2.4484	24	5	35.3	1.009
15	15	33	24.11	2.3064	22	17	7.8	5.394	15	17	28	19.28	2.4493	24	4	30.3	1.157
16	15	35	42.64	2.3112	22	22	27.9	5.275	16	17	30	46.26	2.4500	24	3	16.5	1.303
17	15	38	1.45	2.3158	22	27	40.8	5.155	17	17	33	13.28	2.4506	24	1	53.9	1.451
18	15	40	20.54	2.3204	22	32	46.5	5.035	18	17	35	40.33	2.4511	24	0	22.4	1.598
19	15	42	39.90	2.3249	22	37	45.0	4.913	19	17	38	7.41	2.4515	23	58	42.1	1.745
20	15	44	59.53	2.3295	22	42	36.1	4.790	20	17	40	34.51	2.4518	23	56	53.0	1.893
21	15	47	19.44	2.3340	22	47	19.8	4.667	21	17	43	1.62	2.4519	23	54	55.0	2.040
22	15	49	39.61	2.3383	22	51	56.1	4.543	22	17	45	28.74	2.4521	23	52	48.2	2.188
23	15	52	0.04	2.3427	22	56	24.9	4.417	23	17	47	55.87	2.4521	23	50	32.5	2.335
24	15	54	20.73	2.3470	-23	0	46.1	-4.290	24	17	50	22.99	2.4519	-23	48	8.0	-2.555

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 17.					NOVEMBER 19.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	17 50 22.99	2.4519	-23 48 8.0	+2.482	0	19 46 20.47	2.3543	-19 7 15.0	+8.972
1	17 52 50.10	2.4518	23 45 34.7	2.628	1	19 48 41.63	2.3511	18 58 13.2	9.083
2	17 55 17.20	2.4515	23 42 52.6	2.775	2	19 51 2.60	2.3478	18 49 4.5	9.202
3	17 57 44.28	2.4510	23 40 1.7	2.922	3	19 53 23.36	2.3444	18 39 49.0	9.315
4	18 0 11.32	2.4505	23 37 2.0	3.068	4	19 55 43.93	2.3412	18 30 26.7	9.428
5	18 2 38.34	2.4500	23 33 53.5	3.214	5	19 58 4.30	2.3378	18 20 57.7	9.539
6	18 5 5.32	2.4493	23 30 36.3	3.359	6	20 0 24.46	2.3344	18 11 22.0	9.650
7	18 7 32.25	2.4485	23 27 10.4	3.505	7	20 2 44.43	2.3311	18 1 39.7	9.759
8	18 9 59.14	2.4477	23 23 35.7	3.651	8	20 5 4.19	2.3277	17 51 50.9	9.867
9	18 12 25.97	2.4467	23 19 52.3	3.796	9	20 7 23.75	2.3243	17 41 55.7	9.974
10	18 14 52.74	2.4456	23 16 0.2	3.940	10	20 9 43.11	2.3210	17 31 54.0	10.081
11	18 17 19.44	2.4444	23 11 59.5	4.084	11	20 12 2.27	2.3176	17 21 46.0	10.185
12	18 19 46.07	2.4433	23 7 50.1	4.228	12	20 14 21.22	2.3142	17 11 31.8	10.283
13	18 22 12.63	2.4419	23 3 32.1	4.372	13	20 16 39.97	2.3108	17 1 11.4	10.392
14	18 24 39.10	2.4405	22 59 5.5	4.515	14	20 18 58.52	2.3074	16 50 44.8	10.493
15	18 27 5.49	2.4391	22 54 30.3	4.658	15	20 21 16.86	2.3041	16 40 12.2	10.593
16	18 29 31.79	2.4375	22 49 46.6	4.799	16	20 23 35.01	2.3008	16 29 33.7	10.692
17	18 31 57.99	2.4358	22 44 54.4	4.941	17	20 25 52.95	2.2973	16 18 49.2	10.790
18	18 34 24.09	2.4341	22 39 53.7	5.082	18	20 28 10.69	2.2941	16 7 58.9	10.887
19	18 36 50.08	2.4323	22 34 44.6	5.222	19	20 30 28.24	2.2908	15 57 2.8	10.983
20	18 39 15.96	2.4304	22 29 27.1	5.363	20	20 32 45.58	2.2874	15 46 0.9	11.078
21	18 41 41.73	2.4285	22 24 1.1	5.502	21	20 35 2.73	2.2841	15 34 53.5	11.170
22	18 44 7.38	2.4264	22 18 26.9	5.639	22	20 37 19.67	2.2808	15 23 40.5	11.263
23	18 46 32.90	2.4243	-22 12 44.4	+5.778	23	20 39 36.43	2.2776	-15 12 22.0	+11.353
NOVEMBER 18.					NOVEMBER 20.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	18 48 58.30	2.4222	-22 6 53.6	+5.915	0	20 41 52.98	2.2743	-15 0 58.1	+11.443
1	18 51 23.56	2.4199	22 0 54.6	6.052	1	20 44 9.34	2.2712	14 49 28.9	11.531
2	18 53 48.69	2.4177	21 54 47.4	6.188	2	20 46 25.52	2.2680	14 37 54.4	11.618
3	18 56 13.68	2.4153	21 48 32.1	6.323	3	20 48 41.50	2.2648	14 26 14.7	11.705
4	18 58 38.53	2.4129	21 42 8.6	6.458	4	20 50 57.29	2.2617	14 14 29.8	11.789
5	19 1 3.23	2.4103	21 35 37.1	6.591	5	20 53 12.90	2.2586	14 2 40.0	11.873
6	19 3 27.77	2.4078	21 28 57.7	6.724	6	20 55 28.32	2.2555	13 50 45.1	11.955
7	19 5 52.16	2.4053	21 22 10.2	6.858	7	20 57 43.56	2.2524	13 38 45.4	12.036
8	19 8 16.40	2.4026	21 15 14.8	6.988	8	20 59 58.61	2.2494	13 26 40.8	12.116
9	19 10 40.47	2.3998	21 8 11.6	7.119	9	21 2 13.49	2.2464	13 14 31.5	12.194
10	19 13 4.38	2.3972	21 1 0.5	7.249	10	21 4 28.18	2.2434	13 2 17.5	12.273
11	19 15 28.13	2.3943	20 53 41.7	7.378	11	21 6 42.70	2.2406	12 49 58.8	12.348
12	19 17 51.70	2.3914	20 46 15.2	7.506	12	21 8 57.05	2.2378	12 37 35.7	12.423
13	19 20 15.10	2.3886	20 38 41.0	7.633	13	21 11 11.23	2.2348	12 25 8.1	12.496
14	19 22 38.33	2.3857	20 30 59.2	7.759	14	21 13 25.23	2.2321	12 12 36.2	12.568
15	19 25 1.38	2.3826	20 23 9.9	7.885	15	21 15 39.08	2.2293	11 59 59.9	12.640
16	19 27 24.24	2.3796	20 15 13.0	8.010	16	21 17 52.75	2.2266	11 47 19.4	12.709
17	19 29 46.93	2.3766	20 7 8.7	8.133	17	21 20 6.27	2.2239	11 34 34.8	12.778
18	19 32 9.43	2.3735	19 58 57.0	8.256	18	21 22 19.62	2.2213	11 21 46.0	12.846
19	19 34 31.75	2.3703	19 50 38.0	8.378	19	21 24 32.83	2.2188	11 8 53.3	12.911
20	19 36 53.87	2.3672	19 42 11.7	8.498	20	21 26 45.87	2.2162	10 55 56.7	12.976
21	19 39 15.81	2.3641	19 33 38.2	8.618	21	21 28 58.77	2.2138	10 42 56.2	13.040
22	19 41 37.56	2.3608	19 24 57.6	8.737	22	21 31 11.52	2.2113	10 29 51.9	13.103
23	19 43 59.11	2.3576	19 16 9.8	8.855	23	21 33 24.13	2.2089	10 16 43.9	13.163
24	19 46 20.47	2.3543	-19 7 15.0	+8.972	24	21 35 36.59	2.2066	-10 3 32.3	+13.223

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 21.					NOVEMBER 23.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	21 35 36.59	2.2066	-10 3 32.3	+13.223	0	23 19 57.57	2.1663	+ 1 15 13.6	+14.551
1	21 37 48.92	2.2043	9 50 17.2	13.281	1	23 22 7.57	2.1670	1 29 46.5	14.546
2	21 40 1.11	2.2020	9 36 58.6	13.338	2	23 24 17.61	2.1678	1 44 19.1	14.540
3	21 42 13.16	2.1998	9 23 36.6	13.394	3	23 26 27.71	2.1688	1 58 51.3	14.532
4	21 44 25.09	2.1978	9 10 11.3	13.449	4	23 28 37.87	2.1698	2 13 22.9	14.523
5	21 46 36.89	2.1957	8 56 42.7	13.503	5	23 30 48.08	2.1708	2 27 54.0	14.513
6	21 48 48.57	2.1938	8 43 11.0	13.554	6	23 32 58.37	2.1720	2 42 24.4	14.499
7	21 51 0.14	2.1918	8 29 36.2	13.605	7	23 35 8.72	2.1732	2 56 53.9	14.486
8	21 53 11.58	2.1898	8 15 58.4	13.654	8	23 37 19.15	2.1744	3 11 22.7	14.472
9	21 55 22.91	2.1880	8 2 17.7	13.702	9	23 39 29.65	2.1757	3 25 50.5	14.455
10	21 57 34.14	2.1862	7 48 34.2	13.749	10	23 41 40.23	2.1771	3 40 17.3	14.438
11	21 59 45.25	2.1844	7 34 47.8	13.795	11	23 43 50.90	2.1786	3 54 43.1	14.419
12	22 1 56.27	2.1828	7 20 58.8	13.838	12	23 46 1.66	2.1801	4 9 7.6	14.398
13	22 4 7.19	2.1812	7 7 7.2	13.882	13	23 48 12.51	2.1817	4 23 30.9	14.377
14	22 6 18.01	2.1797	6 53 13.0	13.923	14	23 50 23.46	2.1833	4 37 52.8	14.353
15	22 8 28.75	2.1782	6 39 16.4	13.963	15	23 52 34.51	2.1851	4 52 13.2	14.328
16	22 10 39.39	2.1767	6 25 17.4	14.003	16	23 54 45.67	2.1868	5 6 32.2	14.303
17	22 12 49.95	2.1754	6 11 16.1	14.040	17	23 56 56.93	2.1887	5 20 49.6	14.275
18	22 15 0.44	2.1741	5 57 12.6	14.077	18	23 59 8.31	2.1906	5 35 5.2	14.246
19	22 17 10.84	2.1728	5 43 6.9	14.112	19	0 1 19.80	2.1925	5 49 19.1	14.216
20	22 19 21.18	2.1716	5 28 59.2	14.146	20	0 3 31.41	2.1945	6 3 31.1	14.184
21	22 21 31.45	2.1706	5 14 49.4	14.178	21	0 5 43.14	2.1966	6 17 41.2	14.151
22	22 23 41.65	2.1695	5 0 37.8	14.209	22	0 7 55.00	2.1988	6 31 49.2	14.117
23	22 25 51.79	2.1686	- 4 46 24.3	+14.239	23	0 10 6.99	2.2009	+ 6 45 55.2	+14.081
NOVEMBER 22.					NOVEMBER 24.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 28 1.88	2.1678	- 4 32 9.1	+14.268	0	0 12 19.11	2.2032	+ 6 59 58.9	+14.043
1	22 30 11.92	2.1668	4 17 52.2	14.294	1	0 14 31.37	2.2054	7 14 0.3	14.004
2	22 32 21.90	2.1661	4 3 33.8	14.320	2	0 16 43.76	2.2078	7 27 59.4	13.964
3	22 34 31.85	2.1654	3 49 13.8	14.345	3	0 18 56.31	2.2103	7 41 56.0	13.923
4	22 36 41.75	2.1648	3 34 52.4	14.368	4	0 21 8.99	2.2127	7 55 50.1	13.879
5	22 38 51.62	2.1642	3 20 29.6	14.390	5	0 23 21.83	2.2153	8 9 41.5	13.834
6	22 41 1.45	2.1637	3 6 5.6	14.410	6	0 25 34.82	2.2178	8 23 30.2	13.788
7	22 43 11.26	2.1633	2 51 40.4	14.430	7	0 27 47.97	2.2205	8 37 16.1	13.741
8	22 45 21.04	2.1628	2 37 14.0	14.448	8	0 30 1.28	2.2232	8 50 59.1	13.692
9	22 47 30.80	2.1625	2 22 46.7	14.464	9	0 32 14.75	2.2258	9 4 39.1	13.642
10	22 49 40.54	2.1623	2 8 18.3	14.480	10	0 34 28.38	2.2286	9 18 16.1	13.589
11	22 51 50.28	2.1622	1 53 49.1	14.493	11	0 36 42.18	2.2314	9 31 49.8	13.536
12	22 54 0.00	2.1620	1 39 19.1	14.506	12	0 38 56.15	2.2343	9 45 20.4	13.482
13	22 56 9.72	2.1620	1 24 48.4	14.518	13	0 41 10.29	2.2373	9 58 47.6	13.425
14	22 58 19.44	2.1621	1 10 17.0	14.528	14	0 43 24.62	2.2403	10 12 11.4	13.368
15	23 0 29.17	2.1622	0 55 45.1	14.536	15	0 45 39.12	2.2432	10 25 31.8	13.309
16	23 2 38.90	2.1623	0 41 12.7	14.543	16	0 47 53.80	2.2462	10 38 48.5	13.248
17	23 4 48.65	2.1626	0 26 40.0	14.548	17	0 50 8.66	2.2493	10 52 1.5	13.186
18	23 6 58.41	2.1628	- 0 12 6.9	14.554	18	0 52 23.72	2.2525	11 5 10.8	13.123
19	23 9 8.19	2.1633	+ 0 2 26.5	14.557	19	0 54 38.96	2.2556	11 18 16.2	13.058
20	23 11 18.00	2.1638	0 16 59.9	14.558	20	0 56 54.39	2.2588	11 31 17.7	12.992
21	23 13 27.84	2.1643	0 31 33.4	14.559	21	0 59 10.02	2.2621	11 44 15.2	12.924
22	23 15 37.71	2.1648	0 46 7.0	14.558	22	1 1 25.84	2.2653	11 57 8.6	12.854
23	23 17 47.62	2.1655	1 0 40.4	14.555	23	1 3 41.85	2.2686	12 9 57.7	12.783
24	23 19 57.57	2.1663	+ 1 15 13.6	+14.551	24	1 5 58.07	2.2720	+12 22 42.6	+12.712

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
NOVEMBER 25.					NOVEMBER 27.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	1 5 58.07	2.2720	+12 22 42.6	+12.712	0	2 59 3.30	2.4348	+20 43 36.9	+7.670
1	1 8 14.49	2.2755	12 35 23.1	12.638	1	3 1 29.47	2.4374	20 51 13.1	7.537
2	1 10 31.11	2.2788	12 47 59.2	12.563	2	3 3 55.79	2.4400	20 58 41.3	7.402
3	1 12 47.94	2.2822	13 0 30.7	12.487	3	3 6 22.27	2.4426	21 6 1.3	7.266
4	1 15 4.97	2.2856	13 12 57.6	12.409	4	3 8 48.90	2.4450	21 13 13.2	7.130
5	1 17 22.21	2.2891	13 25 19.8	12.330	5	3 11 15.67	2.4473	21 20 16.9	6.993
6	1 19 39.66	2.2925	13 37 37.2	12.249	6	3 13 42.57	2.4496	21 27 12.4	6.855
7	1 21 57.31	2.2960	13 49 49.7	12.167	7	3 16 9.62	2.4518	21 33 59.5	6.716
8	1 24 15.18	2.2996	14 1 57.2	12.083	8	3 18 36.79	2.4539	21 40 38.3	6.577
9	1 26 33.26	2.3032	14 13 59.6	11.998	9	3 21 4.09	2.4560	21 47 8.7	6.437
10	1 28 51.56	2.3068	14 25 57.0	11.913	10	3 23 31.51	2.4579	21 53 30.7	6.295
11	1 31 10.07	2.3103	14 37 49.1	11.824	11	3 25 59.04	2.4598	21 59 44.1	6.153
12	1 33 28.79	2.3138	14 49 35.9	11.735	12	3 28 26.69	2.4618	22 5 49.1	6.012
13	1 35 47.73	2.3175	15 1 17.3	11.645	13	3 30 54.45	2.4634	22 11 45.5	5.868
14	1 38 6.89	2.3211	15 12 53.3	11.553	14	3 33 22.30	2.4651	22 17 33.3	5.724
15	1 40 26.26	2.3247	15 24 23.7	11.459	15	3 35 50.26	2.4667	22 23 12.4	5.580
16	1 42 45.85	2.3283	15 35 48.4	11.365	16	3 38 18.30	2.4680	22 28 42.9	5.436
17	1 45 5.66	2.3320	15 47 7.5	11.269	17	3 40 46.42	2.4694	22 34 4.7	5.291
18	1 47 25.69	2.3356	15 58 20.7	11.171	18	3 43 14.63	2.4708	22 39 17.8	5.144
19	1 49 45.93	2.3392	16 9 28.0	11.073	19	3 45 42.91	2.4718	22 44 22.0	4.998
20	1 52 6.39	2.3428	16 20 29.4	10.973	20	3 48 11.25	2.4729	22 49 17.5	4.852
21	1 54 27.07	2.3464	16 31 24.7	10.871	21	3 50 39.66	2.4739	22 54 4.2	4.704
22	1 56 47.96	2.3500	16 42 13.9	10.768	22	3 53 8.12	2.4748	22 58 42.0	4.557
23	1 59 9.07	2.3536	+16 52 56.9	+10.664	23	3 55 36.63	2.4756	+23 3 11.0	+4.408
NOVEMBER 26.					NOVEMBER 28.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	2 1 30.39	2.3572	+17 3 33.6	+10.558	0	3 58 5.19	2.4763	+23 7 31.0	+4.259
1	2 3 51.93	2.3608	17 14 3.9	10.462	1	4 0 33.79	2.4768	23 11 42.1	4.111
2	2 6 13.69	2.3644	17 24 27.8	10.344	2	4 3 2.41	2.4773	23 15 44.3	3.963
3	2 8 35.66	2.3679	17 34 45.2	10.235	3	4 5 31.07	2.4778	23 19 37.6	3.813
4	2 10 57.84	2.3714	17 44 56.0	10.124	4	4 7 59.74	2.4779	23 23 21.9	3.663
5	2 13 20.23	2.3749	17 55 0.1	10.013	5	4 10 28.42	2.4781	23 26 57.2	3.513
6	2 15 42.83	2.3784	18 4 57.5	9.899	6	4 12 57.11	2.4782	23 30 23.5	3.363
7	2 18 5.64	2.3819	18 14 48.0	9.785	7	4 15 25.80	2.4782	23 33 40.8	3.213
8	2 20 28.66	2.3854	18 24 31.7	9.670	8	4 17 54.49	2.4780	23 36 49.1	3.063
9	2 22 51.89	2.3888	18 34 8.4	9.553	9	4 20 23.16	2.4777	23 39 48.3	2.913
10	2 25 15.31	2.3921	18 43 38.0	9.435	10	4 22 51.81	2.4773	23 42 38.6	2.763
11	2 27 38.94	2.3955	18 53 0.6	9.317	11	4 25 20.44	2.4768	23 45 19.8	2.611
12	2 30 2.77	2.3988	19 2 16.0	9.196	12	4 27 49.03	2.4763	23 47 51.9	2.460
13	2 32 26.80	2.4021	19 11 24.1	9.075	13	4 30 17.59	2.4756	23 50 15.0	2.310
14	2 34 51.02	2.4053	19 20 25.0	8.953	14	4 32 46.10	2.4747	23 52 29.1	2.160
15	2 37 15.43	2.4084	19 29 18.4	8.828	15	4 35 14.55	2.4738	23 54 34.2	2.009
16	2 39 40.03	2.4115	19 38 4.4	8.704	16	4 37 42.95	2.4728	23 56 30.2	1.859
17	2 42 4.81	2.4147	19 46 42.9	8.578	17	4 40 11.28	2.4716	23 58 17.3	1.709
18	2 44 29.79	2.4178	19 55 13.8	8.452	18	4 42 39.54	2.4703	23 59 55.3	1.558
19	2 46 54.94	2.4207	20 3 37.1	8.324	19	4 45 7.72	2.4690	24 1 24.3	1.408
20	2 49 20.27	2.4236	20 11 52.7	8.195	20	4 47 35.82	2.4675	24 2 44.3	1.258
21	2 51 45.77	2.4265	20 20 0.5	8.065	21	4 50 3.82	2.4659	24 3 55.3	1.109
22	2 54 11.45	2.4293	20 28 0.5	7.935	22	4 52 31.73	2.4643	24 4 57.4	0.960
23	2 56 37.29	2.4321	20 35 52.7	7.803	23	4 54 59.53	2.4624	24 5 50.5	0.811
24	2 59 3.30	2.4348	+20 43 36.9	+7.670	24	4 57 27.22	2.4605	+24 6 34.7	+0.663



## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.			
NOVEMBER 29.							DECEMBER 1.									
	h	m	s	s	°	'	''		h	m	s	s	°	'	''	
0	4	57	27.22	2.4605	+24	6	34.7	+0.663	0	6	51	34.65	2.2661	+21	58	5.6
1	4	59	54.79	2.4585	24	7	10.0	0.513	1	6	53	50.45	2.2606	21	52	20.0
2	5	2	22.24	2.4564	24	7	36.3	0.365	2	6	56	5.92	2.2551	21	46	27.9
3	5	4	49.56	2.4542	24	7	53.8	0.218	3	6	58	21.06	2.2496	21	40	29.2
4	5	7	16.74	2.4518	24	8	2.4	+0.071	4	7	0	35.87	2.2440	21	34	24.1
5	5	9	43.77	2.4493	24	8	2.3	-0.076	5	7	2	50.34	2.2384	21	28	12.6
6	5	12	10.66	2.4468	24	7	53.3	0.223	6	7	5	4.48	2.2328	21	21	54.8
7	5	14	37.39	2.4442	24	7	35.5	0.369	7	7	7	18.27	2.2272	21	15	30.8
8	5	17	3.96	2.4415	24	7	9.0	0.514	8	7	9	31.74	2.2216	21	9	0.6
9	5	19	30.37	2.4386	24	6	33.8	0.658	9	7	11	44.86	2.2158	21	2	24.2
10	5	21	56.59	2.4357	24	5	50.0	0.803	10	7	13	57.64	2.2103	20	55	41.9
11	5	24	22.65	2.4327	24	4	57.4	0.948	11	7	16	10.09	2.2046	20	48	53.5
12	5	26	48.51	2.4294	24	3	56.3	1.090	12	7	18	22.19	2.1989	20	41	59.2
13	5	29	14.18	2.4263	24	2	46.6	1.233	13	7	20	33.96	2.1933	20	34	59.1
14	5	31	39.66	2.4229	24	1	28.3	1.375	14	7	22	45.38	2.1875	20	27	53.2
15	5	34	4.93	2.4194	24	0	1.6	1.516	15	7	24	56.46	2.1818	20	20	41.6
16	5	36	29.99	2.4159	23	58	26.4	1.657	16	7	27	7.20	2.1762	20	13	24.3
17	5	38	54.84	2.4124	23	56	42.8	1.797	17	7	29	17.60	2.1706	20	6	1.4
18	5	41	19.48	2.4087	23	54	50.8	1.937	18	7	31	27.67	2.1649	19	58	33.1
19	5	43	43.88	2.4048	23	52	50.4	2.075	19	7	33	37.39	2.1592	19	50	59.2
20	5	46	8.06	2.4011	23	50	41.8	2.212	20	7	35	46.77	2.1535	19	43	20.0
21	5	48	32.01	2.3971	23	48	25.0	2.349	21	7	37	55.81	2.1478	19	35	35.4
22	5	50	55.71	2.3931	23	45	59.9	2.486	22	7	40	4.51	2.1423	19	27	45.6
23	5	53	19.18	2.3890	+23	43	26.7	-2.021	23	7	42	12.88	2.1367	+19	19	50.6
NOVEMBER 30.							DECEMBER 2.									
	h	m	s	s	°	'	''		h	m	s	s	°	'	''	
0	5	55	42.39	2.3848	+23	40	45.4	-2.756	0	7	44	20.91	2.1310	+19	11	50.5
1	5	58	5.35	2.3805	23	37	56.0	2.890	1	7	46	28.60	2.1254	19	3	45.3
2	6	0	28.05	2.3762	23	34	58.6	3.023	2	7	48	35.96	2.1198	18	55	35.2
3	6	2	50.49	2.3718	23	31	53.3	3.154	3	7	50	42.98	2.1143	18	47	20.0
4	6	5	12.66	2.3673	23	28	40.1	3.286	4	7	52	49.67	2.1088	18	39	0.1
5	6	7	34.56	2.3628	23	25	19.0	3.416	5	7	54	56.03	2.1033	18	30	35.3
6	6	9	56.19	2.3582	23	21	50.2	3.545	6	7	57	2.06	2.0978	18	22	5.7
7	6	12	17.54	2.3535	23	18	13.6	3.673	7	7	59	7.76	2.0923	18	13	31.5
8	6	14	38.61	2.3488	23	14	29.4	3.801	8	8	1	13.13	2.0868	18	4	52.7
9	6	16	59.40	2.3440	23	10	37.5	3.928	9	8	3	18.17	2.0813	17	56	9.3
10	6	19	19.89	2.3391	23	6	38.1	4.053	10	8	5	22.89	2.0760	17	47	21.4
11	6	21	40.09	2.3342	23	2	31.2	4.178	11	8	7	27.29	2.0706	17	38	29.0
12	6	23	59.99	2.3292	22	58	16.8	4.301	12	8	9	31.36	2.0653	17	29	32.3
13	6	26	19.59	2.3242	22	53	55.1	4.423	13	8	11	35.12	2.0599	17	20	31.3
14	6	28	38.89	2.3192	22	49	26.0	4.546	14	8	13	38.55	2.0547	17	11	26.0
15	6	30	57.89	2.3141	22	44	49.6	4.666	15	8	15	41.68	2.0495	17	2	16.6
16	6	33	16.58	2.3088	22	40	6.1	4.785	16	8	17	44.49	2.0443	16	53	3.0
17	6	35	34.95	2.3036	22	35	15.4	4.904	17	8	19	46.99	2.0391	16	43	45.4
18	6	37	53.01	2.2983	22	30	17.6	5.022	18	8	21	49.18	2.0339	16	34	23.7
19	6	40	10.75	2.2931	22	25	12.8	5.138	19	8	23	51.06	2.0288	16	24	58.1
20	6	42	28.18	2.2878	22	20	1.0	5.253	20	8	25	52.64	2.0238	16	15	28.7
21	6	44	45.28	2.2824	22	14	42.4	5.368	21	8	27	53.92	2.0188	16	5	55.3
22	6	47	2.07	2.2770	22	9	16.9	5.482	22	8	29	54.90	2.0138	15	56	18.2
23	6	49	18.52	2.2715	22	3	44.6	5.594	23	8	31	55.58	2.0088	15	46	37.5
24	6	51	34.65	2.2661	+21	58	5.6	-5.705	24	8	33	55.96	2.0039	+15	36	53.0

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 3.					DECEMBER 5.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	8 33 55.96	2.0039	+15 36 53.0	-9.771	0	10 5 28.11	1.8323	+6 54 33.7	-11.692
1	8 35 56.05	1.9992	15 27 5.0	9.830	1	10 7 17.98	1.8302	6 42 51.5	11.714
2	8 37 55.86	1.9943	15 17 13.4	9.889	2	10 9 7.73	1.8281	6 31 8.0	11.735
3	8 39 55.37	1.9896	15 7 18.3	9.948	3	10 10 57.35	1.8262	6 19 23.3	11.756
4	8 41 54.61	1.9849	14 57 19.7	10.004	4	10 12 46.87	1.8243	6 7 37.3	11.777
5	8 43 53.56	1.9802	14 47 17.8	10.059	5	10 14 36.27	1.8224	5 55 50.1	11.796
6	8 45 52.23	1.9756	14 37 12.6	10.114	6	10 16 25.56	1.8206	5 44 1.8	11.814
7	8 47 50.63	1.9710	14 27 4.1	10.168	7	10 18 14.74	1.8189	5 32 12.4	11.833
8	8 49 48.75	1.9664	14 16 52.4	10.222	8	10 20 3.83	1.8173	5 20 21.9	11.851
9	8 51 46.60	1.9620	14 6 37.5	10.274	9	10 21 52.82	1.8158	5 8 30.3	11.868
10	8 53 44.19	1.9577	13 56 19.5	10.325	10	10 23 41.72	1.8143	4 56 37.8	11.883
11	8 55 41.52	1.9533	13 45 58.5	10.376	11	10 25 30.53	1.8128	4 44 44.3	11.899
12	8 57 38.58	1.9489	13 35 34.4	10.426	12	10 27 19.26	1.8115	4 32 49.9	11.914
13	8 59 35.39	1.9447	13 25 7.4	10.474	13	10 29 7.91	1.8102	4 20 54.6	11.929
14	9 1 31.94	1.9404	13 14 37.5	10.523	14	10 30 56.48	1.8089	4 8 58.4	11.943
15	9 3 28.24	1.9363	13 4 4.7	10.570	15	10 32 44.98	1.8078	3 57 1.5	11.956
16	9 5 24.29	1.9322	12 53 29.1	10.616	16	10 34 33.42	1.8067	3 45 3.7	11.969
17	9 7 20.10	1.9282	12 42 50.8	10.661	17	10 36 21.78	1.8056	3 33 5.2	11.981
18	9 9 15.67	1.9242	12 32 9.8	10.706	18	10 38 10.09	1.8048	3 21 6.0	11.993
19	9 11 11.00	1.9203	12 21 26.1	10.750	19	10 39 58.35	1.8038	3 9 6.1	12.003
20	9 13 6.10	1.9163	12 10 39.8	10.793	20	10 41 46.55	1.8029	2 57 5.6	12.013
21	9 15 0.96	1.9125	11 59 51.0	10.835	21	10 43 34.70	1.8022	2 45 4.5	12.023
22	9 16 55.60	1.9088	11 48 59.6	10.877	22	10 45 22.81	1.8015	2 33 2.8	12.033
23	9 18 50.02	1.9051	+11 38 5.8	-10.917	23	10 47 10.88	1.8009	+2 21 0.6	-12.041
DECEMBER 4.					DECEMBER 6.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	9 20 44.21	1.9014	+11 27 9.6	-10.957	0	10 48 58.92	1.8004	+2 8 57.9	-12.048
1	9 22 38.19	1.8978	11 16 11.0	10.995	1	10 50 46.93	1.7998	1 56 54.8	12.056
2	9 24 31.95	1.8943	11 5 10.2	11.033	2	10 52 34.90	1.7994	1 44 51.2	12.063
3	9 26 25.50	1.8908	10 54 7.0	11.072	3	10 54 22.86	1.7991	1 32 47.3	12.068
4	9 28 18.85	1.8874	10 43 1.6	11.108	4	10 56 10.79	1.7988	1 20 43.0	12.074
5	9 30 11.99	1.8841	10 31 54.1	11.143	5	10 57 58.71	1.7986	1 8 38.4	12.079
6	9 32 4.94	1.8808	10 20 44.4	11.179	6	10 59 46.62	1.7984	0 56 33.5	12.083
7	9 33 57.69	1.8776	10 9 32.6	11.214	7	11 1 34.52	1.7983	0 44 28.4	12.088
8	9 35 50.25	1.8744	9 58 18.7	11.248	8	11 3 22.41	1.7983	0 32 23.0	12.091
9	9 37 42.62	1.8713	9 47 2.9	11.280	9	11 5 10.31	1.7983	0 20 17.5	12.093
10	9 39 34.80	1.8682	9 35 45.1	11.313	10	11 6 58.21	1.7984	+0 8 11.9	12.095
11	9 41 26.80	1.8653	9 24 25.4	11.344	11	11 8 46.12	1.7987	-0 3 53.9	12.097
12	9 43 18.63	1.8623	9 13 3.8	11.375	12	11 10 34.05	1.7989	0 15 59.7	12.098
13	9 45 10.28	1.8593	9 1 40.4	11.405	13	11 12 21.99	1.7992	0 28 5.6	12.098
14	9 47 1.77	1.8568	8 50 15.2	11.435	14	11 14 9.95	1.7996	0 40 11.4	12.097
15	9 48 53.09	1.8539	8 38 48.2	11.464	15	11 15 57.94	1.8001	0 52 17.2	12.097
16	9 50 44.24	1.8513	8 27 19.5	11.492	16	11 17 45.96	1.8006	1 4 23.0	12.095
17	9 52 35.24	1.8487	8 15 49.2	11.519	17	11 19 34.01	1.8011	1 16 28.6	12.093
18	9 54 26.08	1.8462	8 4 17.2	11.546	18	11 21 22.09	1.8018	1 28 34.1	12.090
19	9 56 16.78	1.8437	7 52 43.7	11.572	19	11 23 10.22	1.8025	1 40 39.4	12.087
20	9 58 7.32	1.8412	7 41 8.6	11.598	20	11 24 58.39	1.8033	1 52 44.5	12.083
21	9 59 57.72	1.8389	7 29 32.0	11.622	21	11 26 46.62	1.8042	2 4 49.3	12.078
22	10 1 47.99	1.8366	7 17 54.0	11.646	22	11 28 34.89	1.8051	2 16 53.9	12.073
23	10 3 38.11	1.8343	7 6 14.5	11.669	23	11 30 23.23	1.8061	2 28 58.1	12.067
24	10 5 28.11	1.8323	+ 6 54 33.7	-11.692	24	11 32 11.62	1.8071	-2 41 1.9	-12.060



## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 7.					DECEMBER 9.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	11 32 11.62	1.8071	- 2 41 1.9	-12.060	0	13 1 25.48	1.9356	-12 0 10.4	-10.963
1	11 34 0.08	1.8083	2 53 5.3	12.053	1	13 3 21.74	1.9398	12 11 6.9	10.921
2	11 35 48.61	1.8096	3 5 8.3	12.046	2	13 5 18.26	1.9441	12 22 0.9	10.879
3	11 37 37.22	1.8108	3 17 10.8	12.038	3	13 7 15.03	1.9483	12 32 52.4	10.836
4	11 39 25.90	1.8121	3 29 12.8	12.029	4	13 9 12.06	1.9528	12 43 41.2	10.791
5	11 41 14.67	1.8135	3 41 14.3	12.020	5	13 11 9.36	1.9573	12 54 27.3	10.746
6	11 43 3.52	1.8149	3 53 15.2	12.009	6	13 13 6.93	1.9618	13 5 10.7	10.700
7	11 44 52.46	1.8164	4 5 15.4	11.998	7	13 15 4.77	1.9663	13 15 51.3	10.653
8	11 46 41.49	1.8181	4 17 15.0	11.988	8	13 17 2.88	1.9708	13 26 29.1	10.605
9	11 48 30.63	1.8198	4 29 13.9	11.976	9	13 19 1.27	1.9755	13 37 3.9	10.556
10	11 50 19.86	1.8215	4 41 12.1	11.963	10	13 20 59.94	1.9802	13 47 35.8	10.507
11	11 52 9.21	1.8233	4 53 9.4	11.949	11	13 22 58.89	1.9849	13 58 4.7	10.456
12	11 53 58.66	1.8252	5 5 6.0	11.936	12	13 24 58.13	1.9898	14 8 30.5	10.404
13	11 55 48.23	1.8271	5 17 1.7	11.921	13	13 26 57.66	1.9946	14 18 53.2	10.352
14	11 57 37.91	1.8291	5 28 56.5	11.906	14	13 28 57.48	1.9995	14 29 12.7	10.298
15	11 59 27.72	1.8312	5 40 50.4	11.890	15	13 30 57.60	2.0044	14 39 29.0	10.243
16	12 1 17.65	1.8333	5 52 43.3	11.873	16	13 32 58.01	2.0094	14 49 41.9	10.188
17	12 3 7.71	1.8355	6 4 35.2	11.857	17	13 34 58.73	2.0144	14 59 51.5	10.132
18	12 4 57.91	1.8378	6 16 26.1	11.839	18	13 36 59.74	2.0195	15 9 57.7	10.074
19	12 6 48.24	1.8401	6 28 15.9	11.820	19	13 39 1.07	2.0248	15 20 0.4	10.015
20	12 8 38.72	1.8425	6 40 4.5	11.801	20	13 41 2.71	2.0298	15 29 59.5	9.956
21	12 10 29.34	1.8450	6 51 52.0	11.781	21	13 43 4.65	2.0350	15 39 55.1	9.896
22	12 12 20.12	1.8475	7 3 38.2	11.760	22	13 45 6.91	2.0403	15 49 47.0	9.833
23	12 14 11.04	1.8501	- 7 15 23.2	-11.739	23	13 47 9.49	2.0457	-15 59 35.1	-9.771
DECEMBER 8.					DECEMBER 10.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	12 16 2.13	1.8528	- 7 27 6.9	-11.718	0	13 49 12.39	2.0509	-16 9 19.5	-9.708
1	12 17 53.38	1.8556	7 38 49.3	11.694	1	13 51 15.61	2.0563	16 19 0.0	9.643
2	12 19 44.79	1.8583	7 50 30.2	11.671	2	13 53 19.15	2.0618	16 28 36.7	9.578
3	12 21 36.38	1.8612	8 2 9.8	11.648	3	13 55 23.02	2.0673	16 38 9.3	9.510
4	12 23 28.13	1.8640	8 13 47.9	11.623	4	13 57 27.22	2.0728	16 47 37.9	9.443
5	12 25 20.06	1.8671	8 25 24.5	11.597	5	13 59 31.75	2.0783	16 57 2.4	9.373
6	12 27 12.18	1.8702	8 36 59.5	11.570	6	14 1 36.61	2.0838	17 6 22.7	9.303
7	12 29 4.48	1.8732	8 48 32.9	11.543	7	14 3 41.80	2.0893	17 15 38.8	9.233
8	12 30 56.96	1.8764	9 0 4.6	11.515	8	14 5 47.33	2.0950	17 24 50.6	9.160
9	12 32 49.65	1.8797	9 11 34.7	11.487	9	14 7 53.20	2.1007	17 33 58.0	9.087
10	12 34 42.52	1.8829	9 23 3.0	11.457	10	14 9 59.41	2.1064	17 43 1.0	9.013
11	12 36 35.60	1.8863	9 34 29.5	11.427	11	14 12 5.97	2.1121	17 51 59.5	8.937
12	12 38 28.88	1.8896	9 45 54.2	11.396	12	14 14 12.86	2.1178	18 0 53.4	8.860
13	12 40 22.37	1.8933	9 57 17.0	11.364	13	14 16 20.10	2.1235	18 9 42.7	8.783
14	12 42 16.07	1.8968	10 8 37.9	11.332	14	14 18 27.68	2.1293	18 18 27.3	8.703
15	12 44 9.98	1.9003	10 19 56.8	11.298	15	14 20 35.62	2.1352	18 27 7.1	8.623
16	12 46 4.11	1.9041	10 31 13.7	11.265	16	14 22 43.90	2.1409	18 35 42.0	8.542
17	12 47 58.47	1.9078	10 42 28.6	11.230	17	14 24 52.53	2.1468	18 44 12.1	8.460
18	12 49 53.05	1.9116	10 53 41.3	11.194	18	14 27 1.51	2.1526	18 52 37.2	8.376
19	12 51 47.86	1.9154	11 4 51.9	11.158	19	14 29 10.84	2.1585	19 0 57.2	8.291
20	12 53 42.90	1.9194	11 16 0.2	11.120	20	14 31 20.53	2.1644	19 9 12.1	8.206
21	12 55 38.19	1.9234	11 27 6.3	11.082	21	14 33 30.57	2.1703	19 17 21.9	8.119
22	12 57 33.71	1.9273	11 38 10.0	11.043	22	14 35 40.96	2.1762	19 25 26.4	8.030
23	12 59 29.47	1.9314	11 49 11.4	11.003	23	14 37 51.71	2.1821	19 33 25.5	7.941
24	13 1 25.46	1.9356	-12 0 10.4	-10.963	24	14 40 2.81	2.1880	-19 41 19.3	-7.853

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 11.					DECEMBER 13.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	14 40 2.81	2.1880	-19 41 19.3	-7.851	0	16 31 32.44	2.4406	-23 51 58.2	-2.177
1	14 42 14.27	2.1939	19 49 7.6	7.759	1	16 33 58.99	2.4443	23 54 4.5	2.034
2	14 44 26.08	2.1998	19 56 50.4	7.667	2	16 36 25.76	2.4480	23 56 2.3	1.891
3	14 46 38.25	2.2058	20 4 27.6	7.573	3	16 38 52.75	2.4515	23 57 51.4	1.747
4	14 48 50.77	2.2117	20 11 59.1	7.477	4	16 41 19.94	2.4549	23 59 31.9	1.603
5	14 51 3.65	2.2177	20 19 24.8	7.380	5	16 43 47.34	2.4583	24 1 3.7	1.457
6	14 53 16.89	2.2236	20 26 44.7	7.283	6	16 46 14.94	2.4616	24 2 26.7	1.311
7	14 55 30.48	2.2294	20 33 58.8	7.185	7	16 48 42.73	2.4648	24 3 41.0	1.164
8	14 57 44.42	2.2353	20 41 6.9	7.084	8	16 51 10.71	2.4678	24 4 46.4	1.017
9	14 59 58.72	2.2413	20 48 8.9	6.983	9	16 53 38.86	2.4707	24 5 43.0	0.868
10	15 2 13.37	2.2472	20 55 4.9	6.882	10	16 56 7.19	2.4735	24 6 30.6	0.720
11	15 4 28.38	2.2530	21 1 54.7	6.778	11	16 58 35.68	2.4763	24 7 9.4	0.572
12	15 6 43.73	2.2588	21 8 38.2	6.673	12	17 1 4.34	2.4789	24 7 39.2	0.422
13	15 8 59.44	2.2647	21 15 15.5	6.568	13	17 3 33.15	2.4814	24 8 0.0	0.272
14	15 11 15.49	2.2705	21 21 46.3	6.460	14	17 6 2.11	2.4838	24 8 11.8	-0.122
15	15 13 31.90	2.2763	21 28 10.7	6.353	15	17 8 31.20	2.4860	24 8 14.6	+0.029
16	15 15 48.65	2.2821	21 34 28.6	6.243	16	17 11 0.43	2.4883	24 8 8.3	0.181
17	15 18 5.75	2.2878	21 40 39.8	6.132	17	17 13 29.79	2.4903	24 7 52.9	0.333
18	15 20 23.19	2.2935	21 46 44.4	6.021	18	17 15 59.27	2.4923	24 7 28.4	0.484
19	15 22 40.97	2.2992	21 52 42.3	5.908	19	17 18 28.86	2.4940	24 6 54.8	0.637
20	15 24 59.09	2.3048	21 58 33.4	5.794	20	17 20 58.55	2.4957	24 6 12.0	0.790
21	15 27 17.55	2.3104	22 4 17.6	5.679	21	17 23 28.34	2.4973	24 5 20.0	0.943
22	15 29 36.34	2.3159	22 9 54.9	5.563	22	17 25 58.23	2.4989	24 4 18.9	1.095
23	15 31 55.46	2.3215	-22 15 25.1	-5.445	23	17 28 28.21	2.5003	-24 3 8.6	+1.248
DECEMBER 12.					DECEMBER 14.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	15 34 14.92	2.3271	-22 20 48.3	-5.327	0	17 30 58.26	2.5014	-24 1 49.1	+1.402
1	15 36 34.71	2.3325	22 26 4.3	5.208	1	17 33 28.38	2.5026	24 0 20.4	1.556
2	15 38 54.82	2.3378	22 31 13.2	5.088	2	17 35 58.57	2.5036	23 58 42.4	1.710
3	15 41 15.25	2.3432	22 36 14.8	4.965	3	17 38 28.81	2.5044	23 56 55.2	1.863
4	15 43 36.00	2.3485	22 41 9.0	4.842	4	17 40 59.10	2.5053	23 54 58.8	2.018
5	15 45 57.07	2.3538	22 45 55.8	4.718	5	17 43 29.44	2.5059	23 52 53.1	2.172
6	15 48 18.45	2.3590	22 50 35.2	4.593	6	17 45 59.81	2.5064	23 50 38.2	2.325
7	15 50 40.15	2.3642	22 55 7.0	4.467	7	17 48 30.21	2.5068	23 48 14.1	2.479
8	15 53 2.15	2.3692	22 59 31.2	4.340	8	17 51 0.63	2.5072	23 45 40.7	2.633
9	15 55 24.45	2.3742	23 3 47.8	4.213	9	17 53 31.07	2.5073	23 42 58.1	2.787
10	15 57 47.05	2.3791	23 7 56.7	4.083	10	17 56 1.51	2.5074	23 40 6.3	2.941
11	16 0 9.94	2.3840	23 11 57.8	3.953	11	17 58 31.96	2.5074	23 37 5.2	3.094
12	16 2 33.13	2.3889	23 15 51.1	3.823	12	18 1 2.40	2.5073	23 33 55.0	3.247
13	16 4 56.61	2.3936	23 19 36.5	3.690	13	18 3 32.83	2.5069	23 30 35.6	3.401
14	16 7 20.36	2.3983	23 23 13.9	3.556	14	18 6 3.23	2.5065	23 27 6.9	3.553
15	16 9 44.40	2.4029	23 26 43.2	3.423	15	18 8 33.61	2.5060	23 23 29.2	3.706
16	16 12 8.71	2.4073	23 30 4.6	3.288	16	18 11 3.95	2.5054	23 19 42.2	3.858
17	16 14 33.28	2.4118	23 33 17.8	3.152	17	18 13 34.26	2.5048	23 15 46.2	4.010
18	16 16 58.12	2.4163	23 36 22.8	3.014	18	18 16 4.52	2.5038	23 11 41.0	4.163
19	16 19 23.23	2.4205	23 39 19.5	2.877	19	18 18 34.72	2.5029	23 7 26.7	4.313
20	16 21 48.58	2.4247	23 42 8.0	2.739	20	18 21 4.87	2.5019	23 3 3.4	4.463
21	16 24 14.19	2.4288	23 44 48.2	2.600	21	18 23 34.95	2.5008	22 58 31.1	4.614
22	16 26 40.03	2.4328	23 47 20.0	2.459	22	18 26 4.96	2.4995	22 53 49.7	4.765
23	16 29 6.12	2.4368	23 49 43.3	2.318	23	18 28 34.89	2.4982	22 48 59.3	4.914
24	16 31 32.44	2.4406	-23 51 58.2	-2.177	24	18 31 4.74	2.4967	-22 44 0.0	+5.063

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 15.					DECEMBER 17.				
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>
0	18 31 4.74	2.4967	-22 44 0.0	+ 5.063	0	20 27 45.64	2.3453	-16 5 9.4	+11.143
1	18 33 34.49	2.4951	22 38 51.8	5.211	1	20 30 6.24	2.3414	15 53 57.9	11.240
2	18 36 4.15	2.4935	22 33 34.7	5.359	2	20 32 26.61	2.3374	15 42 40.6	11.335
3	18 38 33.71	2.4917	22 28 8.7	5.507	3	20 34 46.73	2.3335	15 31 17.7	11.430
4	18 41 3.15	2.4898	22 22 33.9	5.653	4	20 37 6.63	2.3296	15 19 49.0	11.523
5	18 43 32.49	2.4879	22 16 50.4	5.798	5	20 39 26.28	2.3256	15 8 14.9	11.614
6	18 46 1.70	2.4858	22 10 58.1	5.944	6	20 41 45.70	2.3218	14 56 35.3	11.705
7	18 48 30.79	2.4838	22 4 57.1	6.088	7	20 44 4.89	2.3178	14 44 50.3	11.793
8	18 50 59.75	2.4816	21 58 47.5	6.232	8	20 46 23.84	2.3138	14 33 0.1	11.881
9	18 53 28.58	2.4793	21 52 29.3	6.375	9	20 48 42.55	2.3100	14 21 4.6	11.968
10	18 55 57.26	2.4768	21 46 2.5	6.518	10	20 51 1.04	2.3063	14 9 4.0	12.052
11	18 58 25.80	2.4744	21 39 27.2	6.659	11	20 53 19.30	2.3023	13 56 58.4	12.134
12	19 0 54.19	2.4718	21 32 43.4	6.800	12	20 55 37.32	2.2985	13 44 47.9	12.216
13	19 3 22.42	2.4692	21 25 51.2	6.939	13	20 57 55.12	2.2948	13 32 32.5	12.296
14	19 5 50.49	2.4665	21 18 50.7	7.078	14	21 0 12.69	2.2909	13 20 12.4	12.374
15	19 8 18.40	2.4638	21 11 41.9	7.216	15	21 2 30.03	2.2872	13 7 47.6	12.452
16	19 10 46.14	2.4608	21 4 24.8	7.353	16	21 4 47.15	2.2835	12 55 18.2	12.528
17	19 13 13.70	2.4579	20 56 59.5	7.489	17	21 7 4.05	2.2798	12 42 44.2	12.603
18	19 15 41.09	2.4550	20 49 26.1	7.624	18	21 9 20.73	2.2763	12 30 5.9	12.675
19	19 18 8.30	2.4520	20 41 44.6	7.758	19	21 11 37.20	2.2726	12 17 23.2	12.747
20	19 20 35.33	2.4488	20 33 55.1	7.892	20	21 13 53.44	2.2689	12 4 36.3	12.817
21	19 23 2.16	2.4457	20 25 57.6	8.024	21	21 16 9.47	2.2654	11 51 45.2	12.885
22	19 25 28.81	2.4425	20 17 52.2	8.155	22	21 18 25.29	2.2620	11 38 50.1	12.953
23	19 27 55.26	2.4392	-20 9 39.0	+ 8.284	23	21 20 40.91	2.2585	-11 25 50.9	+13.018
DECEMBER 16.					DECEMBER 18.				
0	19 30 21.51	2.4358	-20 1 18.1	+ 8.413	0	21 22 56.31	2.2550	-11 12 47.9	+13.082
1	19 32 47.56	2.4324	19 52 49.4	8.542	1	21 25 11.51	2.2517	10 59 41.1	13.145
2	19 35 13.40	2.4290	19 44 13.1	8.668	2	21 27 26.51	2.2483	10 46 30.5	13.207
3	19 37 39.04	2.4255	19 35 29.3	8.793	3	21 29 41.31	2.2450	10 33 16.3	13.266
4	19 40 4.46	2.4219	19 26 37.9	8.918	4	21 31 55.91	2.2418	10 19 58.6	13.324
5	19 42 20.67	2.4184	19 17 39.1	9.041	5	21 34 10.32	2.2385	10 6 37.4	13.382
6	19 44 54.67	2.4148	19 8 33.0	9.163	6	21 36 24.53	2.2353	9 53 12.8	13.438
7	19 47 19.44	2.4111	18 59 19.5	9.284	7	21 38 38.56	2.2323	9 39 44.9	13.491
8	19 49 44.00	2.4074	18 49 58.9	9.403	8	21 40 52.40	2.2292	9 26 13.9	13.543
9	19 52 8.33	2.4037	18 40 31.1	9.523	9	21 43 6.06	2.2262	9 12 39.7	13.595
10	19 54 32.44	2.3999	18 30 56.2	9.639	10	21 45 19.54	2.2232	8 59 2.5	13.644
11	19 56 56.32	2.3962	18 21 14.4	9.755	11	21 47 32.84	2.2203	8 45 22.4	13.693
12	19 59 19.98	2.3924	18 11 25.6	9.870	12	21 49 45.97	2.2174	8 31 39.4	13.739
13	20 1 43.41	2.3885	18 1 30.0	9.983	13	21 51 58.93	2.2146	8 17 53.7	13.785
14	20 4 6.60	2.3846	17 51 27.7	10.095	14	21 54 11.72	2.2118	8 4 5.2	13.829
15	20 6 29.56	2.3808	17 41 18.6	10.206	15	21 56 24.35	2.2092	7 50 14.2	13.871
16	20 8 52.29	2.3769	17 31 3.0	10.315	16	21 58 36.82	2.2065	7 36 20.7	13.913
17	20 11 14.79	2.3730	17 20 40.8	10.423	17	22 0 49.13	2.2039	7 22 24.7	13.953
18	20 13 37.05	2.3690	17 10 12.2	10.530	18	22 3 1.29	2.2014	7 8 26.4	13.990
19	20 15 59.07	2.3651	16 59 37.2	10.636	19	22 5 13.30	2.1989	6 54 25.9	14.027
20	20 18 20.86	2.3612	16 48 55.9	10.740	20	22 7 25.16	2.1965	6 40 23.2	14.063
21	20 20 42.41	2.3573	16 38 8.4	10.843	21	22 9 36.88	2.1943	6 26 18.4	14.097
22	20 23 3.73	2.3533	16 27 14.7	10.945	22	22 11 48.47	2.1919	6 12 11.6	14.129
23	20 25 24.80	2.3493	16 16 15.0	11.044	23	22 13 59.91	2.1897	5 58 2.9	14.161
24	20 27 45.64	2.3453	-16 5 9.4	+11.143	24	22 16 11.23	2.1876	-5 43 52.3	+14.228

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 19.					DECEMBER 21.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	22 16 11.23	2.1876	-5 43 52.3	+14.191	0	23 59 58.31	2.1632	+ 5 45 37.7	+14.028
1	22 18 22.42	2.1854	5 29 40.0	14.218	1	0 2 8.13	2.1643	5 59 38.3	13.992
2	22 20 33.48	2.1833	5 15 26.1	14.246	2	0 4 18.03	2.1656	6 13 36.7	13.955
3	22 22 44.42	2.1814	5 1 10.5	14.272	3	0 6 28.00	2.1668	6 27 32.9	13.917
4	22 24 55.25	2.1796	4 46 53.5	14.295	4	0 8 38.05	2.1682	6 41 26.7	13.878
5	22 27 5.97	2.1777	4 32 35.1	14.318	5	0 10 48.18	2.1695	6 55 18.2	13.838
6	22 29 16.57	2.1759	4 18 15.3	14.340	6	0 12 58.39	2.1710	7 9 7.2	13.795
7	22 31 27.08	2.1743	4 3 54.3	14.359	7	0 15 8.70	2.1726	7 22 53.6	13.752
8	22 33 37.48	2.1725	3 49 32.2	14.378	8	0 17 19.10	2.1742	7 36 37.4	13.708
9	22 35 47.78	2.1710	3 35 8.9	14.396	9	0 19 29.60	2.1758	7 50 18.5	13.662
10	22 37 58.00	2.1695	3 20 44.7	14.412	10	0 21 40.20	2.1775	8 3 56.8	13.615
11	22 40 8.12	2.1680	3 6 19.5	14.427	11	0 23 50.90	2.1793	8 17 32.3	13.568
12	22 42 18.16	2.1667	2 51 53.5	14.439	12	0 26 1.71	2.1811	8 31 4.9	13.518
13	22 44 28.12	2.1654	2 37 26.8	14.452	13	0 28 12.63	2.1830	8 44 34.4	13.467
14	22 46 38.01	2.1642	2 22 59.3	14.462	14	0 30 23.67	2.1849	8 58 0.9	13.415
15	22 48 47.82	2.1629	2 8 31.4	14.470	15	0 32 34.82	2.1868	9 11 24.2	13.362
16	22 50 57.56	2.1618	1 54 2.9	14.479	16	0 34 46.09	2.1889	9 24 44.3	13.307
17	22 53 7.24	2.1610	1 39 33.9	14.485	17	0 36 57.49	2.1911	9 38 1.0	13.251
18	22 55 16.86	2.1601	1 25 4.7	14.490	18	0 39 9.02	2.1932	9 51 14.4	13.194
19	22 57 26.43	2.1590	1 10 35.1	14.494	19	0 41 20.67	2.1953	10 4 24.3	13.136
20	22 59 35.94	2.1582	0 56 5.4	14.496	20	0 43 32.46	2.1976	10 17 30.7	13.077
21	23 1 45.41	2.1574	0 41 35.6	14.497	21	0 45 44.38	2.1999	10 30 33.5	13.017
22	23 3 54.83	2.1567	0 27 5.8	14.497	22	0 47 56.45	2.2023	10 43 32.7	12.954
23	23 6 4.21	2.1561	-0 12 36.0	+14.495	23	0 50 8.65	2.2046	+10 56 28.0	+12.891
DECEMBER 20.					DECEMBER 22.				
	h m s	s	° ' "	"		h m s	s	° ' "	"
0	23 8 13.56	2.1556	+0 1 53.6	+14.492	0	0 52 21.00	2.2071	+11 9 19.6	+12.827
1	23 10 22.88	2.1551	0 16 23.0	14.488	1	0 54 33.50	2.2096	11 22 7.2	12.761
2	23 12 32.17	2.1547	0 30 52.1	14.482	2	0 56 46.15	2.2121	11 34 50.9	12.694
3	23 14 41.44	2.1543	0 45 20.8	14.475	3	0 58 58.95	2.2147	11 47 30.5	12.626
4	23 16 50.69	2.1541	0 59 49.1	14.467	4	1 1 11.91	2.2173	12 0 6.0	12.556
5	23 18 59.93	2.1539	1 14 16.8	14.458	5	1 3 25.03	2.2200	12 12 37.2	12.485
6	23 21 9.16	2.1538	1 28 44.0	14.447	6	1 5 38.31	2.2227	12 25 4.2	12.414
7	23 23 18.38	2.1537	1 43 10.4	14.433	7	1 7 51.75	2.2254	12 37 26.9	12.341
8	23 25 27.60	2.1538	1 57 36.0	14.420	8	1 10 5.36	2.2283	12 49 45.1	12.267
9	23 27 36.83	2.1538	2 12 0.8	14.406	9	1 12 19.14	2.2310	13 1 58.9	12.191
10	23 29 46.06	2.1539	2 26 24.7	14.390	10	1 14 33.08	2.2338	13 14 8.0	12.114
11	23 31 55.30	2.1542	2 40 47.6	14.373	11	1 16 47.20	2.2368	13 26 12.6	12.037
12	23 34 4.56	2.1545	2 55 9.4	14.353	12	1 19 1.49	2.2397	13 38 12.4	11.957
13	23 36 13.84	2.1548	3 9 30.0	14.333	13	1 21 15.96	2.2426	13 50 7.4	11.877
14	23 38 23.14	2.1552	3 23 49.4	14.312	14	1 23 30.60	2.2456	14 1 57.6	11.796
15	23 40 32.46	2.1557	3 38 7.4	14.289	15	1 25 45.43	2.2486	14 13 42.9	11.713
16	23 42 41.82	2.1563	3 52 24.1	14.266	16	1 28 0.43	2.2516	14 25 23.1	11.628
17	23 44 51.22	2.1569	4 6 39.3	14.240	17	1 30 15.62	2.2547	14 36 58.3	11.543
18	23 47 0.65	2.1576	4 20 52.9	14.213	18	1 32 30.99	2.2578	14 48 28.3	11.458
19	23 49 10.13	2.1583	4 35 4.9	14.186	19	1 34 46.55	2.2608	14 59 53.2	11.370
20	23 51 19.65	2.1592	4 49 15.2	14.157	20	1 37 2.29	2.2640	15 11 12.7	11.280
21	23 53 29.23	2.1601	5 3 23.7	14.126	21	1 39 18.23	2.2672	15 22 26.8	11.191
22	23 55 38.86	2.1610	5 17 30.3	14.094	22	1 41 34.35	2.2703	15 33 35.6	11.100
23	23 57 48.55	2.1621	5 31 35.0	14.062	23	1 43 50.66	2.2734	15 44 38.8	11.008
24	23 59 58.31	2.1632	+5 45 37.7	+14.028	24	1 46 7.16	2.2767	+15 55 36.5	+10.914

## GREENWICH MEAN TIME.

Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.			Var. per Min.	Declination.	Var. per Min.
DECEMBER 23.							DECEMBER 25.						
	h	m	s	s	"	"		h	m	s	s	"	"
0	1	46	7.16	2.2767	+15 55 36.5	+10.914	0	3	38	56.14	2.4122	+22 31 48.8	+5.239
1	1	48	23.86	2.2798	16 6 28.5	10.820	1	3	41	20.92	2.4138	22 36 59.0	5.102
2	1	50	40.74	2.2831	16 17 14.9	10.724	2	3	43	45.80	2.4154	22 42 1.0	4.963
3	1	52	57.83	2.2863	16 27 55.4	10.627	3	3	46	10.77	2.4170	22 46 54.6	4.824
4	1	55	15.10	2.2895	16 38 30.1	10.529	4	3	48	35.84	2.4184	22 51 39.9	4.685
5	1	57	32.57	2.2928	16 48 58.9	10.431	5	3	51	0.98	2.4198	22 56 16.8	4.545
6	1	59	50.24	2.2961	16 59 21.8	10.330	6	3	53	26.21	2.4211	23 0 45.3	4.404
7	2	2	8.10	2.2993	17 9 38.5	10.228	7	3	55	51.51	2.4223	23 5 5.3	4.263
8	2	4	26.16	2.3026	17 19 49.2	10.127	8	3	58	16.89	2.4234	23 9 16.9	4.123
9	2	6	44.41	2.3058	17 29 53.7	10.023	9	4	0	42.32	2.4244	23 13 20.0	3.981
10	2	9	2.85	2.3090	17 39 51.9	9.918	10	4	3	7.82	2.4254	23 17 14.6	3.839
11	2	11	21.49	2.3123	17 49 43.8	9.813	11	4	5	33.37	2.4263	23 21 0.7	3.697
12	2	13	40.33	2.3156	17 59 29.4	9.706	12	4	7	58.97	2.4271	23 24 38.2	3.554
13	2	15	59.36	2.3188	18 9 8.5	9.598	13	4	10	24.62	2.4278	23 28 7.2	3.412
14	2	18	18.59	2.3221	18 18 41.1	9.480	14	4	12	50.30	2.4283	23 31 27.6	3.268
15	2	20	38.01	2.3253	18 28 7.2	9.379	15	4	15	16.02	2.4288	23 34 39.4	3.125
16	2	22	57.62	2.3284	18 37 26.6	9.268	16	4	17	41.76	2.4292	23 37 42.6	2.982
17	2	25	17.42	2.3316	18 46 39.3	9.156	17	4	20	7.52	2.4295	23 40 37.2	2.838
18	2	27	37.41	2.3348	18 55 45.3	9.043	18	4	22	33.30	2.4298	23 43 23.2	2.694
19	2	29	57.59	2.3379	19 4 44.5	8.928	19	4	24	59.09	2.4299	23 46 0.5	2.550
20	2	32	17.96	2.3411	19 13 36.7	8.813	20	4	27	24.89	2.4299	23 48 29.2	2.407
21	2	34	38.52	2.3442	19 22 22.1	8.698	21	4	29	50.68	2.4298	23 50 49.3	2.262
22	2	36	59.26	2.3472	19 31 0.5	8.581	22	4	32	16.46	2.4297	23 53 0.6	2.117
23	2	39	20.18	2.3503	+19 39 31.8	+8.463	23	4	34	42.24	2.4294	+23 55 3.3	+1.973
DECEMBER 24.							DECEMBER 26.						
0	2	41	41.29	2.3533	+19 47 56.0	+8.343	0	4	37	7.99	2.4290	+23 56 57.4	+1.829
1	2	44	2.58	2.3563	19 56 13.0	8.223	1	4	39	33.72	2.4286	23 58 42.8	1.684
2	2	46	24.05	2.3593	20 4 22.8	8.103	2	4	41	59.42	2.4281	24 0 19.5	1.540
3	2	48	45.69	2.3622	20 12 25.4	7.982	3	4	44	25.09	2.4274	24 1 47.6	1.396
4	2	51	7.51	2.3651	20 20 20.6	7.858	4	4	46	50.71	2.4266	24 3 7.0	1.251
5	2	53	29.50	2.3678	20 28 8.4	7.735	5	4	49	16.28	2.4258	24 4 17.7	1.107
6	2	55	51.65	2.3707	20 35 48.8	7.611	6	4	51	41.80	2.4248	24 5 19.8	0.963
7	2	58	13.98	2.3735	20 43 21.7	7.485	7	4	54	7.25	2.4238	24 6 13.3	0.819
8	3	0	36.47	2.3762	20 50 47.0	7.359	8	4	56	32.65	2.4227	24 6 58.1	0.675
9	3	2	59.12	2.3788	20 58 4.8	7.233	9	4	58	57.97	2.4213	24 7 34.3	0.532
10	3	5	21.93	2.3815	21 5 14.9	7.104	10	5	1	23.21	2.4199	24 8 1.9	0.388
11	3	7	44.90	2.3841	21 12 17.3	6.976	11	5	3	48.36	2.4185	24 8 20.9	0.245
12	3	10	8.02	2.3866	21 19 12.0	6.847	12	5	6	13.43	2.4170	24 8 31.3	+0.103
13	3	12	31.29	2.3891	21 25 58.9	6.717	13	5	8	38.40	2.4153	24 8 33.2	-0.040
14	3	14	54.71	2.3915	21 32 38.0	6.586	14	5	11	3.27	2.4137	24 8 26.5	0.183
15	3	17	18.27	2.3938	21 39 9.2	6.453	15	5	13	28.04	2.4118	24 8 11.2	0.325
16	3	19	41.97	2.3962	21 45 32.4	6.322	16	5	15	52.69	2.4098	24 7 47.5	0.466
17	3	22	5.81	2.3983	21 51 47.8	6.189	17	5	18	17.22	2.4078	24 7 15.3	0.607
18	3	24	29.77	2.4005	21 57 55.1	6.055	18	5	20	41.63	2.4057	24 6 34.7	0.748
19	3	26	53.87	2.4027	22 3 54.4	5.921	19	5	23	5.90	2.4034	24 5 45.5	0.889
20	3	29	18.09	2.4048	22 9 45.6	5.785	20	5	25	30.04	2.4012	24 4 48.0	1.028
21	3	31	42.44	2.4067	22 15 28.6	5.649	21	5	27	54.04	2.3988	24 3 42.1	1.168
22	3	34	6.89	2.4085	22 21 3.5	5.514	22	5	30	17.89	2.3963	24 2 27.8	1.308
23	3	36	31.46	2.4104	22 26 30.3	5.378	23	5	32	41.59	2.3937	24 1 5.2	1.446
24	3	38	56.14	2.4122	+22 31 48.8	+5.239	24	5	35	5.13	2.3910	+23 59 34.3	+1.588

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 27.					DECEMBER 29.				
0	h m s	s	" "	"	0	h m s	s	" "	"
0	5 35 5.13	2.3910	+23 59 34.3	-1.584	0	7 25 23.44	2.1849	+20 18 21.5	-7.289
1	5 37 28.51	2.3883	23 57 55.1	1.722	1	7 27 34.38	2.1798	20 11 1.3	7.385
2	5 39 51.72	2.3853	23 56 7.7	1.858	2	7 29 45.01	2.1745	20 3 35.3	7.479
3	5 42 14.75	2.3824	23 54 12.1	1.995	3	7 31 55.32	2.1693	19 56 3.8	7.572
4	5 44 37.61	2.3794	23 52 8.3	2.131	4	7 34 5.32	2.1640	19 48 26.7	7.664
5	5 47 0.28	2.3763	23 49 56.4	2.266	5	7 36 15.00	2.1588	19 40 44.1	7.754
6	5 49 22.77	2.3732	23 47 36.4	2.401	6	7 38 24.37	2.1536	19 32 56.2	7.844
7	5 51 45.06	2.3698	23 45 8.3	2.535	7	7 40 33.43	2.1483	19 25 2.8	7.934
8	5 54 7.15	2.3665	23 42 32.2	2.668	8	7 42 42.16	2.1430	19 17 4.1	8.021
9	5 56 29.04	2.3631	23 39 48.1	2.801	9	7 44 50.59	2.1378	19 9 0.3	8.108
10	5 58 50.72	2.3595	23 36 56.1	2.933	10	7 46 58.70	2.1325	19 0 51.2	8.193
11	6 1 12.18	2.3559	23 33 56.2	3.063	11	7 49 6.49	2.1273	18 52 37.1	8.278
12	6 3 33.43	2.3523	23 30 48.5	3.193	12	7 51 13.97	2.1221	18 44 17.9	8.361
13	6 5 54.45	2.3485	23 27 33.0	3.323	13	7 53 21.14	2.1169	18 35 53.8	8.443
14	6 8 15.25	2.3448	23 24 9.7	3.453	14	7 55 28.00	2.1117	18 27 24.7	8.525
15	6 10 35.82	2.3408	23 20 38.7	3.580	15	7 57 34.54	2.1064	18 18 50.8	8.604
16	6 12 56.15	2.3369	23 17 0.1	3.708	16	7 59 40.77	2.1013	18 10 12.2	8.683
17	6 15 16.25	2.3329	23 13 13.8	3.834	17	8 1 46.70	2.0962	18 1 28.8	8.763
18	6 17 36.10	2.3288	23 9 20.0	3.960	18	8 3 52.31	2.0909	17 52 40.7	8.839
19	6 19 55.70	2.3247	23 5 18.6	4.085	19	8 5 57.61	2.0858	17 43 48.1	8.915
20	6 22 15.06	2.3205	23 1 9.8	4.208	20	8 8 2.61	2.0808	17 34 50.9	8.990
21	6 24 34.16	2.3163	22 56 53.6	4.331	21	8 10 7.30	2.0757	17 25 49.3	9.063
22	6 26 53.01	2.3119	22 52 30.1	4.453	22	8 12 11.69	2.0706	17 16 43.3	9.137
23	6 29 11.59	2.3075	+22 47 59.2	-4.575	23	8 14 15.77	2.0655	+17 7 32.9	-9.209
DECEMBER 28.					DECEMBER 30.				
0	h m s	s	" "	"	0	h m s	s	" "	"
0	6 31 29.91	2.3031	+22 43 21.1	-4.695	0	8 16 19.55	2.0605	+16 58 18.2	-9.279
1	6 33 47.96	2.2986	22 38 35.8	4.815	1	8 18 23.03	2.0555	16 48 59.4	9.348
2	6 36 5.74	2.2941	22 33 43.3	4.933	2	8 20 26.21	2.0505	16 39 36.4	9.418
3	6 38 23.25	2.2895	22 28 43.8	5.050	3	8 22 29.09	2.0456	16 30 9.3	9.485
4	6 40 40.48	2.2848	22 23 37.3	5.168	4	8 24 31.68	2.0407	16 20 38.2	9.552
5	6 42 57.43	2.2802	22 18 23.7	5.283	5	8 26 33.97	2.0358	16 11 3.1	9.618
6	6 45 14.10	2.2754	22 13 3.3	5.398	6	8 28 35.97	2.0309	16 1 24.1	9.682
7	6 47 30.48	2.2707	22 7 36.0	5.512	7	8 30 37.68	2.0261	15 51 41.3	9.745
8	6 49 46.58	2.2658	22 2 1.9	5.624	8	8 32 39.10	2.0213	15 41 54.7	9.808
9	6 52 2.38	2.2610	21 56 21.1	5.737	9	8 34 40.23	2.0165	15 32 4.3	9.870
10	6 54 17.90	2.2562	21 50 33.5	5.848	10	8 36 41.08	2.0118	15 22 10.3	9.930
11	6 56 33.12	2.2512	21 44 39.4	5.957	11	8 38 41.64	2.0070	15 12 12.7	9.990
12	6 58 48.04	2.2463	21 38 38.7	6.066	12	8 40 41.92	2.0024	15 2 11.5	10.049
13	7 1 2.67	2.2413	21 32 31.5	6.173	13	8 42 41.93	1.9978	14 52 6.8	10.106
14	7 3 16.99	2.2362	21 26 17.9	6.280	14	8 44 41.65	1.9932	14 41 58.8	10.163
15	7 5 31.01	2.2313	21 19 57.9	6.386	15	8 46 41.11	1.9887	14 31 47.3	10.219
16	7 7 44.74	2.2262	21 13 31.6	6.490	16	8 48 40.29	1.9842	14 21 32.5	10.273
17	7 9 58.15	2.2210	21 6 59.1	6.594	17	8 50 39.21	1.9797	14 11 14.5	10.327
18	7 12 11.26	2.2160	21 0 20.3	6.697	18	8 52 37.85	1.9752	14 0 53.3	10.380
19	7 14 24.07	2.2108	20 53 35.5	6.798	19	8 54 36.23	1.9709	13 50 28.9	10.433
20	7 16 36.56	2.2057	20 46 44.6	6.899	20	8 56 34.36	1.9666	13 40 1.4	10.483
21	7 18 48.75	2.2005	20 39 47.6	6.998	21	8 58 32.22	1.9622	13 29 30.9	10.533
22	7 21 0.62	2.1953	20 32 44.8	7.097	22	9 0 29.82	1.9579	13 18 57.4	10.583
23	7 23 12.19	2.1902	20 25 36.0	7.194	23	9 2 27.17	1.9538	13 8 21.0	10.631
24	7 25 23.44	2.1849	+20 18 21.5	-7.289	24	9 4 24.27	1.9496	+12 57 41.7	-10.678

## GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
DECEMBER 31.					DECEMBER 31.				
	<b>h m s</b>	<b>s</b>	<b>° ' "</b>	<b>"</b>		<b>h m s</b>	<b>s</b>	<b>° ' "</b>	<b>"</b>
0	9 4 24.27	1.9406	+12 57 41.7	-10.678	12	9 27 30.92	1.9034	+10 46 25.8	-11.178
1	9 6 21.12	1.9455	12 46 59.6	10.725	13	9 29 25.02	1.8999	10 35 14.0	11.214
2	9 8 17.73	1.9414	12 36 14.7	10.770	14	9 31 18.91	1.8964	10 24 0.1	11.249
3	9 10 14.09	1.9373	12 25 27.2	10.815	15	9 33 12.59	1.8931	10 12 44.1	11.283
4	9 12 10.21	1.9334	12 14 36.9	10.859	16	9 35 6.08	1.8898	10 1 26.1	11.318
5	9 14 6.10	1.9295	12 3 44.1	10.902	17	9 36 59.36	1.8863	9 50 6.0	11.351
6	9 16 1.75	1.9256	11 52 48.7	10.943	18	9 38 52.44	1.8832	9 38 44.0	11.383
7	9 17 57.17	1.9218	11 41 50.9	10.985	19	9 40 45.34	1.8800	9 27 20.1	11.414
8	9 19 52.36	1.9180	11 30 50.5	11.026	20	9 42 38.04	1.8768	9 15 54.3	11.444
9	9 21 47.33	1.9143	11 19 47.8	11.065	21	9 44 30.56	1.8738	9 4 26.8	11.474
10	9 23 42.08	1.9107	11 8 42.7	11.103	22	9 46 22.89	1.8707	8 52 57.4	11.503
11	9 25 36.61	1.9070	10 57 35.4	11.141	23	9 48 15.04	1.8678	8 41 26.4	11.531
12	9 27 30.92	1.9034	+10 46 25.8	-11.178	24	9 50 7.02	1.8648	+ 8 29 53.7	-11.558

## PHASES OF THE MOON.

○ Full Moon	Jan.	d h m	7 19 42.0	Apr.	d h m	7 1 48.8	July	d h m	4 9 40.5	Sept.	d h m	30 8 31.1
☾ Last Quarter			15 23 42.1			14 8 12.0			11 0 11.9	Oct.		7 10 14.3
● New Moon			22 19 40.0			21 2 1.3			18 15 0.1			15 14 41.0
☾ First Quarter			29 13 1.5			28 17 22.0			26 18 40.4			23 2 37.7
○ Full Moon	Feb.		6 15 28.4	May		6 14 43.3	Aug.		2 17 10.9			29 18 19.2
☾ Last Quarter			14 13 53.2			13 13 47.9			9 7 56.4	Nov.		6 5 3.5
● New Moon			21 6 9.0			20 12 46.8			17 6 21.0			14 6 28.5
☾ First Quarter			28 4 43.7			28 11 33.5			25 7 8.2			21 10 28.8
○ Full Moon	Mar.		8 9 58.0	June		5 1 6.7	Sept.		1 0 28.5			28 6 41.3
☾ Last Quarter			16 0 33.1			11 18 38.5			7 19 5.2	Dec.		6 2 13.8
● New Moon			22 16 5.0			19 1 2.2			15 22 27.5			13 21 17.3
☾ First Quarter			29 22 36.4			27 4 8.4			23 17 41.4			20 18 7.3
○ Full Moon	Apr.		7 1 48.8	July		4 9 40.5			30 8 31.1			27 21 51.6
☾ Last Quarter			14 8 12.0			11 0 11.9	Oct.		7 10 14.3			

## APOGEE.

	<b>d h</b>
January	9 20.4
February	5 20.7
March	5 2.9
April	1 19.2
April	29 14.2
May	27 9.4
June	24 3.1

## PERIGEE.

	<b>d h</b>
July	21 17.6
August	18 0.5
September	14 2.7
October	11 12.5
November	8 5.4
December	6 2.3

## PERIGEE.

	<b>d h</b>		<b>d h</b>
January	23 0.6	August	3 9.9
February	20 13.3	August	31 19.9
March	20 21.2	September	29 6.1
April	17 15.2	October	27 10.8
May	13 6.6	November	23 18.5
June	8 8.2	December	18 10.2
July	6 3.6		



## GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
		" ' "	" ' "	" "	" "	"	d	Jan.		h m	m	
Jan.	1.0	22 50 37.6	+5 17 1.2	15 36.4	57 10.73	-1.810	7.6	Jan.	1	U	6 47.4	2.01
	1.5	29 24 53.3	5 13 6.2	15 30.6	56 49.55	1.718	8.1		1	L	19 11.6	2.03
	2.0	35 54 31.8	5 5 12.4	15 25.2	56 29.55	1.615	8.6		2	U	7 36.2	2.06
	2.5	42 19 50.8	4 53 33.4	15 20.1	56 10.81	1.508	9.1		2	L	20 1.2	2.10
	3.0	48 41 8.7	4 38 24.2	15 15.3	55 53.38	1.396	9.6		3	U	8 26.5	2.13
	3.5	54 58 43.7	+4 20 1.2	15 10.9	55 37.30	-1.286	10.1		3	L	20 52.2	2.15
	4.0	61 12 54.5	3 58 42.0	15 6.9	55 22.51	1.175	10.6		4	U	9 18.1	2.16
	4.5	67 23 58.6	3 34 44.9	15 3.2	55 9.01	1.070	11.1		4	L	21 44.1	2.17
	5.0	73 32 13.1	3 8 29.1	14 59.9	54 56.80	0.969	11.6		5	U	10 10.1	2.16
	5.5	79 37 54.2	2 40 14.4	14 56.9	54 45.73	0.872	12.1		5	L	22 36.0	2.14
	6.0	85 41 17.2	+2 10 21.1	14 54.2	54 35.85	-0.774	12.6		6	U	11 1.6	2.12
	6.5	91 42 37.4	1 39 9.7	14 51.8	54 27.12	0.682	13.1		6	L	23 26.8	2.09
	7.0	97 42 9.2	1 7 1.4	14 49.7	54 19.49	0.589	13.6		7	U	11 51.5	2.05
	7.5	103 40 7.1	0 34 16.8	14 48.0	54 12.98	0.495	14.1					
	8.0	109 36 45.5	+0 1 16.6	14 46.5	54 7.61	0.400	14.6		8	L	0 15.6	1.98
	8.5	115 32 19.0	-0 31 38.6	14 45.3	54 3.41	-0.300	15.1		8	U	12 39.0	1.93
	9.0	121 27 3.0	1 4 8.8	14 44.5	54 0.44	0.195	15.6		9	L	1 1.8	1.88
	9.5	127 21 13.5	1 35 54.5	14 44.1	53 58.76	-0.083	16.1		9	U	13 24.1	1.83
	10.0	133 15 7.7	2 6 37.0	14 44.0	53 58.47	+0.037	16.6		10	L	1 45.7	1.79
	10.5	139 9 4.0	2 35 58.1	14 44.3	53 59.67	0.165	17.1		10	U	14 6.9	1.75
	11.0	145 3 22.0	-3 3 40.7	14 45.1	54 2.47	+0.303	17.6		11	L	2 27.6	1.71
	11.5	150 58 23.3	3 29 28.1	14 46.3	54 6.98	0.450	18.1		11	U	14 48.0	1.69
	12.0	156 54 30.9	3 53 4.7	14 48.0	54 13.31	0.606	18.6		12	L	3 8.3	1.68
	12.5	162 52 9.5	4 14 15.6	14 50.3	54 21.58	0.774	19.1		12	U	15 28.4	1.68
	13.0	168 51 45.4	4 32 46.6	14 53.1	54 31.90	0.947	19.6		13	L	3 48.6	1.69
	13.5	174 53 46.8	-4 48 24.2	14 56.5	54 44.34	+1.127	20.1		13	U	16 9.0	1.71
	14.0	180 58 42.6	5 0 55.3	15 0.5	54 58.97	1.311	20.6		14	L	4 29.6	1.74
	14.5	187 7 3.4	5 10 7.9	15 5.1	55 15.81	1.496	21.1		14	U	16 50.8	1.78
	15.0	193 19 19.9	5 15 50.5	15 10.3	55 34.86	1.678	21.6		15	L	5 12.5	1.84
	15.5	199 36 2.7	5 17 52.4	15 16.0	55 56.05	1.853	22.1		15	U	17 35.0	1.91
	16.0	205 57 42.2	-5 16 3.7	15 22.4	56 19.29	+2.017	22.6		16	L	5 58.4	1.98
	16.5	212 24 47.2	5 10 16.4	15 29.2	56 44.39	2.162	23.1		16	U	18 22.8	2.07
	17.0	218 57 43.9	5 0 23.8	15 36.5	57 11.09	2.284	23.6		17	L	6 48.3	2.18
	17.5	225 36 55.1	4 46 21.9	15 44.1	57 39.09	2.377	24.1		17	U	19 15.1	2.28
	18.0	232 22 39.2	4 28 9.7	15 52.0	58 7.96	2.428	24.6		18	L	7 43.1	2.39
	18.5	239 15 8.1	-4 5 49.9	16 0.0	58 37.18	+2.434	25.1		18	U	20 12.4	2.49
	19.0	246 14 26.5	3 39 30.2	16 7.8	59 6.17	2.388	25.6		19	L	8 42.7	2.56
	19.5	253 20 30.6	3 9 24.1	16 15.5	59 34.26	2.283	26.1		19	U	21 13.9	2.63
	20.0	260 33 6.7	2 35 51.1	16 22.7	60 0.73	2.117	26.6		20	L	9 45.7	2.66
	20.5	267 51 50.2	1 59 17.5	16 29.3	60 24.82	1.889	27.1		20	U	22 17.7	2.67
	21.0	275 16 5.8	-1 20 17.0	16 35.0	60 45.82	+1.600	27.6		21	L	10 49.6	2.65
	21.5	282 45 7.2	-0 39 29.3	16 39.7	61 3.01	1.256	28.1		21	U	23 21.1	2.60
	22.0	290 17 57.7	+0 2 19.8	16 43.2	61 15.80	0.869	28.6					
	22.5	297 53 32.6	0 44 20.4	16 45.3	61 23.74	0.451	29.1		22	L	11 52.0	2.53
	23.0	305 30 40.0	1 25 40.9	16 46.1	61 26.56	+0.018	0.2		23	U	0 21.9	2.46
	23.5	313 8 4.4	+2 5 29.7	16 45.4	61 24.17	-0.415	0.7		23	L	12 50.9	2.38
	24.0	320 44 29.8	+2 42 57.9	16 43.4	61 16.68	-0.828	1.2		24	U	1 19.0	2.30

## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	" ' "	" ' "	" ' "	" ' "	"	d		h m	m	
Jan. 24.0	320 44 29.8	+2 42 57.9	16 43.4	61 16.68	-0.828	1.2	Jan. 24	U	1 19.0	2.30
24.5	328 18 41.4	3 17 21.3	16 40.1	61 4.41	1.210	1.7	24	L	13 46.2	2.23
25.0	335 49 29.8	3 48 2.9	16 35.5	60 47.80	1.548	2.2	25	U	2 12.6	2.17
25.5	343 15 53.5	4 14 32.7	16 30.0	60 27.48	1.890	2.7	25	L	14 38.4	2.12
26.0	350 37 0.2	4 36 29.7	16 23.6	60 4.12	2.062	3.2	26	U	3 3.6	2.09
26.5	357 52 8.4	+4 53 41.0	16 16.7	59 38.47	-2.213	3.7	26	L	15 28.5	2.06
27.0	5 0 48.5	5 6 1.1	16 9.2	59 11.25	2.314	4.2	27	U	3 53.2	2.05
27.5	12 2 41.9	5 13 31.7	16 1.6	58 43.14	2.360	4.7	27	L	16 17.8	2.05
28.0	18 57 40.9	5 16 19.7	15 53.9	58 14.80	2.355	5.2	28	U	4 42.4	2.06
28.5	25 45 47.1	5 14 36.6	15 46.2	57 46.80	2.306	5.7	28	L	17 7.2	2.07
29.0	32 27 10.6	+5 8 37.0	15 38.8	57 19.59	-2.224	6.2	29	U	5 32.1	2.09
29.5	39 2 8.7	4 58 37.9	15 31.7	56 53.54	2.113	6.7	29	L	17 57.3	2.11
30.0	45 31 3.6	4 44 57.8	15 25.0	56 28.98	1.978	7.2	30	U	6 22.8	2.13
30.5	51 54 21.6	4 27 56.1	15 18.8	56 6.14	1.828	7.7	30	L	18 48.5	2.15
31.0	58 12 32.0	4 7 52.4	15 13.1	55 45.15	1.669	8.2	31	U	7 14.4	2.16
31.5	64 26 5.7	+3 45 6.7	15 7.9	55 26.10	-1.504	8.7	31	L	19 40.3	2.17
Feb. 1.0	70 35 34.2	3 19 59.0	15 3.2	55 9.05	1.338	9.2	Feb. 1	U	8 6.3	2.16
1.5	76 41 29.3	2 52 49.0	14 59.1	54 53.98	1.172	9.7	1	L	20 32.2	2.14
2.0	82 44 21.7	2 23 56.3	14 55.6	54 40.89	1.011	10.2	2	U	8 57.8	2.12
2.5	88 44 41.4	1 53 40.4	14 52.5	54 29.69	0.857	10.7	2	L	21 23.1	2.09
3.0	94 42 56.4	+1 22 21.0	14 49.9	54 20.30	-0.709	11.2	3	U	9 48.0	2.05
3.5	100 39 33.6	0 50 17.5	14 47.9	54 12.64	0.568	11.7	3	L	22 12.3	2.00
4.0	106 34 57.2	+0 17 49.3	14 46.2	54 6.64	0.435	12.2	4	U	10 36.1	1.98
4.5	112 29 30.1	-0 14 44.3	14 45.0	54 2.18	0.309	12.7	4	L	22 59.2	1.91
5.0	118 23 32.8	0 47 3.9	14 44.2	53 59.19	0.191	13.2	5	U	11 21.8	1.86
5.5	124 17 24.4	-1 18 50.2	14 43.8	53 57.57	-0.079	13.7	5	L	23 43.8	1.81
6.0	130 11 22.4	1 49 44.3	14 43.7	53 57.28	+0.030	14.2	6	U	12 5.4	1.77
6.5	136 5 42.6	2 19 27.5	14 43.9	53 58.27	0.135	14.7				
7.0	142 0 39.9	2 47 41.7	14 44.6	54 0.51	0.238	15.2	7	L	0 26.4	1.74
7.5	147 56 28.4	3 14 9.3	14 45.5	54 3.99	0.342	15.7	7	U	12 47.2	1.71
8.0	153 53 21.4	-3 38 33.3	14 46.8	54 8.73	+0.448	16.2	8	L	1 7.6	1.69
8.5	159 51 32.3	4 0 37.8	14 48.4	54 14.74	0.555	16.7	8	U	13 27.9	1.69
9.0	165 51 14.5	4 20 7.8	14 50.4	54 22.07	0.667	17.2	9	L	1 48.1	1.69
9.5	171 52 41.9	4 36 49.3	14 52.8	54 30.78	0.785	17.7	9	U	14 8.4	1.70
10.0	177 56 9.1	4 50 29.6	14 55.6	54 40.94	0.908	18.2	10	L	2 28.9	1.71
10.5	184 1 51.8	-5 0 57.2	14 58.8	54 52.59	+1.035	18.7	10	U	14 49.6	1.74
11.0	190 10 7.0	5 8 2.0	15 2.4	55 5.81	1.168	19.2	11	L	3 10.8	1.78
11.5	196 21 13.0	5 11 35.2	15 6.4	55 20.65	1.306	19.7	11	U	15 32.5	1.84
12.0	202 35 29.4	5 11 29.5	15 10.9	55 37.14	1.444	20.2	12	L	3 55.0	1.90
12.5	208 53 17.0	5 7 39.3	15 15.8	55 55.31	1.583	20.7	12	U	16 18.2	1.97
13.0	215 14 57.6	-5 0 0.6	15 21.2	56 15.13	+1.719	21.2	13	L	4 42.3	2.05
13.5	221 40 53.9	4 48 31.7	15 27.1	56 36.53	1.847	21.7	13	U	17 7.4	2.14
14.0	228 11 28.3	4 33 12.6	15 33.3	56 59.40	1.963	22.2	14	L	5 33.6	2.23
14.5	234 47 2.7	4 14 6.1	15 39.9	57 23.57	2.062	22.7	14	U	18 0.8	2.31
15.0	241 27 57.7	3 51 18.0	15 46.8	57 48.78	2.137	23.2	15	L	6 29.1	2.40
15.5	248 14 31.4	-3 24 57.6	15 53.8	58 14.73	+2.183	23.7	15	U	18 58.3	2.47
16.0	255 6 58.1	-2 55 18.3	16 1.0	58 41.02	+2.191	24.2	16	L	7 28.3	2.53

## GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
		" " "	" " "	" " "	" " "	"	d			h m	m
Feb.	16.0	255 6 58.1	-2 55 18.3	16 1.0	58 41.02	+2.191	24.2	Feb. 16	L	7 28.3	2.53
	16.5	262 5 27.0	2 22 37.8	16 8.1	59 7.15	2.156	24.7	16	U	19 58.9	2.56
	17.0	269 10 1.0	1 47 19.2	16 15.1	59 32.56	2.071	25.2	17	L	8 29.7	2.57
	17.5	276 20 35.1	1 9 50.7	16 21.6	59 56.64	1.932	25.7	17	U	21 0.5	2.56
	18.0	283 36 54.9	-0 30 45.9	16 27.6	60 18.72	1.738	26.2	18	L	9 31.1	2.53
	18.5	290 58 35.7	+0 9 16.3	16 32.9	60 38.13	+1.483	26.7	18	U	22 1.3	2.49
	19.0	298 25 1.8	0 49 32.6	16 37.3	60 54.20	1.188	27.2	19	L	10 30.8	2.43
	19.5	305 55 26.6	1 29 16.1	16 40.6	61 6.33	0.833	27.7	19	U	22 59.6	2.37
	20.0	313 28 52.7	2 7 39.0	16 42.7	61 14.04	0.448	28.2	20	L	11 27.7	2.31
	20.5	321 4 13.7	2 43 53.3	16 43.5	61 16.98	+0.039	28.7	20	U	23 55.1	2.26
	21.0	328 40 16.6	+3 17 13.7	16 43.0	61 14.96	-0.375	29.2			.....	....
	21.5	336 15 44.4	3 46 59.4	16 41.0	61 8.00	0.782	0.2	21	L	12 22.0	2.21
	22.0	343 49 19.1	4 12 36.5	16 37.9	60 56.28	1.166	0.7	22	U	0 48.3	2.18
	22.5	351 19 45.3	4 33 39.0	16 33.5	60 40.17	1.512	1.2	22	L	13 14.3	2.15
	23.0	358 45 53.7	4 49 49.5	16 28.0	60 20.19	1.809	1.7	23	U	1 40.0	2.13
	23.5	6 6 43.6	+5 0 59.1	16 21.7	59 56.97	-2.051	2.2	23	L	14 5.6	2.13
	24.0	13 21 25.6	5 7 7.8	16 14.7	59 31.20	2.234	2.7	24	U	2 31.1	2.13
	24.5	20 29 21.8	5 8 22.4	16 7.1	59 3.59	2.357	3.2	24	L	14 56.7	2.14
	25.0	27 30 7.5	5 4 55.9	15 59.3	58 34.87	2.420	3.7	25	U	3 22.5	2.15
	25.5	34 23 30.3	4 57 5.6	15 51.4	58 5.73	2.428	4.2	25	L	15 48.4	2.17
	26.0	41 9 29.3	+4 45 12.4	15 43.5	57 36.78	-2.389	4.7	26	U	4 14.5	2.19
	26.5	47 48 14.0	4 29 39.0	15 35.8	57 8.57	2.307	5.2	26	L	16 40.9	2.20
	27.0	54 20 2.5	4 10 48.9	15 28.4	56 41.56	2.191	5.7	27	U	5 7.3	2.21
	27.5	60 45 20.1	3 49 6.0	15 21.5	56 16.11	2.047	6.2	27	L	17 33.9	2.21
	28.0	67 4 37.6	3 24 53.6	15 15.1	55 52.54	1.881	6.7	28	U	6 0.3	2.20
	28.5	73 18 29.6	+2 58 34.4	15 9.2	55 31.05	-1.699	7.2	28	L	18 26.7	2.19
Mar.	1.0	79 27 33.6	2 30 30.4	15 4.0	55 11.81	1.506	7.7	Mar. 1	U	6 52.8	2.16
	1.5	85 32 28.7	2 1 2.4	14 59.4	54 54.92	1.309	8.2	1	L	19 18.5	2.12
	2.0	91 33 54.1	1 30 30.5	14 55.4	54 40.40	1.112	8.7	2	U	7 43.7	2.08
	2.5	97 32 28.8	0 59 13.9	14 52.1	54 28.24	0.915	9.2	2	L	20 8.4	2.03
	3.0	103 28 51.1	+0 27 31.5	14 49.4	54 18.42	-0.722	9.7	3	U	8 32.6	1.98
	3.5	109 23 37.4	-0 4 18.6	14 47.4	54 10.88	0.536	10.2	3	L	20 56.1	1.93
	4.0	115 17 22.1	0 35 58.4	14 45.9	54 5.50	0.360	10.7	4	U	9 19.0	1.88
	4.5	121 10 37.5	1 7 10.2	14 45.0	54 2.18	0.194	11.2	4	L	21 41.4	1.84
	5.0	127 3 53.0	1 37 36.3	14 44.6	54 0.80	-0.038	11.7	5	U	10 3.2	1.80
	5.5	132 57 35.1	-2 6 59.2	14 44.7	54 1.22	+0.106	12.2	5	L	22 24.6	1.77
	6.0	138 52 7.7	2 35 1.5	14 45.3	54 3.30	0.239	12.7	6	U	10 45.6	1.74
	6.5	144 47 51.5	3 1 25.9	14 46.3	54 6.90	0.360	13.2	6	L	23 6.3	1.72
	7.0	150 45 4.5	3 25 55.4	14 47.7	54 11.90	0.472	13.7	7	U	11 26.8	1.70
	7.5	156 44 1.7	3 48 13.7	14 49.4	54 18.19	0.575	14.2	7	L	23 47.2	1.70
	8.0	162 44 55.6	-4 8 4.8	14 51.4	54 25.64	+0.066	14.7	8	U	12 7.7	1.71
	8.5	168 47 56.5	4 25 13.7	14 53.7	54 34.16	0.753	15.2			.....	....
	9.0	174 53 12.5	4 39 26.5	14 56.3	54 43.69	0.833	15.7	9	L	0 28.2	1.72
	9.5	181 0 50.3	4 50 30.7	14 59.2	54 54.14	0.908	16.2	9	U	12 49.0	1.74
	10.0	187 10 55.3	4 58 15.3	15 2.3	55 5.49	0.982	16.7	10	L	1 10.1	1.78
	10.5	193 23 32.5	-5 2 31.4	15 5.6	55 17.70	+1.053	17.2	10	U	13 31.7	1.82
	11.0	199 38 46.4	-5 3 11.7	15 9.1	55 30.76	+1.124	17.7	11	L	1 53.9	1.87

## GREENWICH MEAN TIME.

O. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
		" ' "	" ' "	" "	" "	"	d			h m	m	
Mar.	10.0	187 10 55.3	-4 58 15.3	15 2.3	55 5.49	+0.982	16.7	Mar. 10	L	1 10.1	1.78	
	10.5	193 23 32.5	5 2 31.4	15 5.6	55 17.70	1.053	17.2	10	U	13 31.7	1.82	
	11.0	199 38 46.4	5 3 11.7	15 9.1	55 30.76	1.124	17.7	11	L	1 53.9	1.87	
	11.5	205 56 42.1	5 0 11.4	15 12.9	55 44.67	1.195	18.2	11	U	14 16.7	1.93	
	12.0	212 17 25.3	4 53 28.0	15 17.0	55 59.43	1.266	18.7	12	L	2 40.3	2.00	
	12.5	218 41 3.4	-4 43 1.4	15 21.2	56 15.05	+1.338	19.2	12	U	15 4.7	2.07	
	13.0	225 7 44.6	4 28 53.9	15 25.7	56 31.53	1.409	19.7	13	L	3 30.1	2.15	
	13.5	231 37 38.7	4 11 11.0	15 30.4	56 48.85	1.478	20.2	13	U	15 56.4	2.23	
	14.0	238 10 57.0	3 50 0.4	15 35.4	57 6.97	1.541	20.7	14	L	4 23.6	2.30	
	14.5	244 47 52.3	3 25 32.9	15 40.5	57 25.80	1.597	21.2	14	U	16 51.5	2.36	
	15.0	251 28 37.8	-2 58 2.4	15 45.8	57 45.25	+1.643	21.7	15	L	5 20.2	2.41	
	15.5	258 13 26.9	2 27 46.0	15 51.2	58 5.16	1.673	22.2	15	U	17 49.5	2.46	
	16.0	265 2 32.4	1 55 4.2	15 56.7	58 25.32	1.682	22.7	16	L	6 19.0	2.47	
	16.5	271 56 5.4	1 20 20.5	16 2.2	58 45.44	1.667	23.2	16	U	18 48.7	2.47	
	17.0	278 54 14.0	0 44 2.4	16 7.6	59 5.20	1.622	23.7	17	L	7 18.3	2.46	
	17.5	285 57 2.1	-0 6 40.7	16 12.8	59 24.23	+1.544	24.2	17	U	19 47.6	2.43	
	18.0	293 4 27.8	+0 31 10.3	16 17.6	59 42.09	1.426	24.7	18	L	8 16.4	2.38	
	18.5	300 16 22.3	1 8 53.5	16 22.0	59 58.28	1.267	25.2	18	U	20 44.8	2.33	
	19.0	307 32 28.4	1 45 49.4	16 25.9	60 12.32	1.067	25.7	19	L	9 12.6	2.29	
	19.5	314 52 20.0	2 21 17.2	16 29.0	60 23.72	0.827	26.2	19	U	21 39.8	2.25	
	20.0	322 15 21.1	+2 54 35.7	16 31.2	60 32.03	+0.553	26.7	20	L	10 6.5	2.21	
	20.5	329 40 46.1	3 25 5.3	16 32.6	60 36.85	+0.248	27.2	20	U	22 32.8	2.18	
	21.0	337 7 41.0	3 52 9.0	16 32.8	60 37.88	-0.079	27.7	21	L	10 58.8	2.16	
	21.5	344 35 4.9	4 15 14.7	16 32.0	60 34.91	0.416	28.2	21	U	23 24.6	2.14	
	22.0	352 1 51.7	4 33 56.0	16 30.1	60 27.91	0.751	28.7			.....	...	
	22.5	359 26 53.6	+4 47 54.0	16 27.1	60 16.98	-1.070	29.2	22	L	11 50.4	2.14	
	23.0	6 49 3.4	4 56 57.5	16 23.2	60 2.32	1.367	0.3	23	U	0 16.1	2.15	
	23.5	14 7 18.3	5 1 3.0	16 18.2	59 44.31	1.628	0.8	23	L	12 42.0	2.16	
	24.0	21 20 42.0	5 0 15.1	16 12.6	59 23.42	1.848	1.3	24	U	1 8.0	2.18	
	24.5	28 28 27.2	4 54 45.0	16 6.2	59 0.16	2.020	1.8	24	L	13 34.4	2.21	
	25.0	35 29 57.1	+4 44 49.8	15 59.4	58 35.15	-2.139	2.3	25	U	2 1.0	2.24	
	25.5	42 24 46.3	4 30 50.8	15 52.3	58 9.01	2.208	2.8	25	L	14 27.9	2.26	
	26.0	49 12 40.9	4 13 12.5	15 45.0	57 42.33	2.231	3.3	26	U	2 55.0	2.27	
	26.5	55 53 38.1	3 52 20.7	15 37.7	57 15.67	2.205	3.8	26	L	15 22.3	2.27	
	27.0	62 27 45.1	3 28 42.6	15 30.6	56 49.59	2.136	4.3	27	U	3 49.6	2.27	
	27.5	68 55 18.1	+3 2 44.5	15 23.8	56 24.54	-2.033	4.8	27	L	16 16.7	2.26	
	28.0	75 16 40.8	2 34 52.3	15 17.4	56 0.92	1.899	5.3	28	U	4 43.7	2.23	
	28.5	81 32 23.0	2 5 30.5	15 11.4	55 39.07	1.739	5.8	28	L	17 10.3	2.20	
	29.0	87 42 59.3	1 35 2.3	15 6.0	55 19.26	1.560	6.3	29	U	5 36.3	2.15	
	29.5	93 49 7.5	1 3 49.5	15 1.2	55 1.70	1.365	6.8	29	L	18 1.8	2.10	
	30.0	99 51 27.9	+0 32 12.4	14 57.1	54 46.55	-1.160	7.3	30	U	6 26.7	2.04	
	30.5	105 50 41.9	+0 0 29.9	14 53.6	54 33.89	0.949	7.8	30	L	18 50.8	1.98	
	31.0	111 47 31.5	-0 30 59.8	14 50.9	54 23.78	0.736	8.3	31	U	7 14.3	1.93	
	31.5	117 42 38.0	1 1 59.5	14 48.8	54 16.22	0.524	8.8	31	L	19 37.2	1.88	
Apr.	1.0	123 36 41.9	1 32 12.4	14 47.5	54 11.18	0.316	9.3	Apr. 1	U	7 59.4	1.83	
	1.5	129 30 22.1	-2 1 22.6	14 46.8	54 8.61	-0.114	9.8	1	L	20 21.1	1.79	
	2.0	135 24 15.4	-2 29 13.9	14 46.7	54 8.39	+0.076	10.3	2	U	8 42.4	1.76	

## GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
		° ' "	° ' "	° ' "	° ' "	"	d	Apr.	1	U	h m	m
Apr.	1.0	123 36 41.9	-1 32 12.4	14 47.5	54 11.18	-0.316	9.3	Apr.	1	U	7 59.4	1.83
	1.5	129 30 22.1	2 1 22.6	14 46.8	54 8.61	-0.114	9.8		1	L	20 21.1	1.79
	2.0	135 24 15.4	2 29 13.9	14 46.7	54 8.39	+0.076	10.3		2	U	8 42.4	1.76
	2.5	141 18 56.0	2 55 30.6	14 47.2	54 10.39	0.256	10.8		2	L	21 3.3	1.73
	3.0	147 14 55.0	3 19 57.1	14 48.4	54 14.49	0.424	11.3		3	U	9 23.9	1.71
	3.5	153 12 40.5	-3 42 17.7	14 50.0	54 20.51	+0.578	11.8		3	L	21 44.4	1.71
	4.0	159 12 36.9	4 2 17.2	14 52.1	54 28.28	0.715	12.3		4	U	10 4.9	1.71
	4.5	165 15 4.9	4 19 40.5	14 54.7	54 37.60	0.837	12.8		4	L	22 25.5	1.72
	5.0	171 20 21.0	4 34 13.5	14 57.6	54 48.29	0.942	13.3		5	U	10 46.2	1.74
	5.5	177 28 38.1	4 45 42.3	15 0.8	55 0.13	1.030	13.8		5	L	23 7.3	1.77
	6.0	183 40 5.0	-4 53 54.9	15 4.3	55 12.94	+1.101	14.3		6	U	11 28.8	1.82
	6.5	189 54 47.0	4 58 40.4	15 8.0	55 26.50	1.156	14.8		6	L	23 50.9	1.86
	7.0	196 12 46.0	4 59 50.0	15 11.8	55 40.64	1.198	15.3		7	U	12 13.6	1.92
	7.5	202 34 0.6	4 57 17.4	15 15.8	55 55.20	1.226	15.8				.....	...
	8.0	208 58 27.4	4 50 58.7	15 19.9	56 10.01	1.242	16.3		8	L	0 37.1	1.99
	8.5	215 26 1.0	-4 40 53.2	15 23.9	56 24.95	+1.247	16.8		8	U	13 1.4	2.06
	9.0	221 56 35.0	4 27 3.3	15 28.0	56 39.91	1.244	17.3		9	L	1 26.5	2.13
	9.5	228 30 2.8	4 9 34.9	15 32.0	56 54.79	1.236	17.8		9	U	13 52.6	2.21
	10.0	235 6 17.9	3 48 37.4	15 36.1	57 9.54	1.222	18.3		10	L	2 19.6	2.28
	10.5	241 45 14.7	3 24 23.6	15 40.0	57 24.10	1.205	18.8		10	U	14 47.3	2.34
	11.0	248 26 49.3	-2 57 9.7	15 44.0	57 38.43	+1.184	19.3		11	L	3 15.8	2.39
	11.5	255 10 59.0	2 27 15.2	15 47.8	57 52.49	1.159	19.8		11	U	15 44.7	2.43
	12.0	261 57 43.3	1 55 2.5	15 51.5	58 6.23	1.131	20.3		12	L	4 14.0	2.45
	12.5	268 47 2.9	1 20 57.0	15 55.2	58 19.62	1.099	20.8		12	U	16 43.3	2.44
	13.0	275 38 59.8	0 45 26.5	15 58.7	58 32.59	1.062	21.3		13	L	5 12.5	2.42
	13.5	282 33 36.7	-0 9 1.0	16 2.1	58 45.07	+1.015	21.8		13	U	17 41.4	2.39
	14.0	289 30 56.1	+0 27 47.6	16 5.3	58 56.90	0.956	22.3		14	L	6 9.9	2.35
	14.5	296 30 59.3	1 4 25.5	16 8.3	59 7.95	0.885	22.8		14	U	18 37.7	2.30
	15.0	303 33 44.9	1 40 18.5	16 11.1	59 18.06	0.796	23.3		15	L	7 5.0	2.25
	15.5	310 39 8.7	2 14 51.2	16 13.5	59 26.99	0.688	23.8		15	U	19 31.7	2.20
	16.0	317 47 1.9	+2 47 28.6	16 15.6	59 34.50	+0.559	24.3		16	L	7 57.9	2.16
	16.5	324 57 10.1	3 17 36.8	16 17.2	59 40.34	0.410	24.8		16	U	20 23.6	2.13
	17.0	332 9 12.8	3 44 43.2	16 18.2	59 44.26	0.239	25.3		17	L	8 49.0	2.10
	17.5	339 22 43.2	4 8 18.2	16 18.7	59 46.01	+0.048	25.8		17	U	21 14.1	2.09
	18.0	346 37 7.9	4 27 55.9	16 18.5	59 45.35	-0.160	26.3		18	L	9 39.2	2.09
	18.5	353 51 47.6	+4 43 14.9	16 17.7	59 42.13	-0.379	26.8		18	U	22 4.2	2.10
	19.0	1 5 58.3	4 53 59.7	16 16.0	59 36.22	0.606	27.3		19	L	10 29.5	2.11
	19.5	8 18 52.6	5 0 0.6	16 13.7	59 27.59	0.832	27.8		19	U	22 55.0	2.14
	20.0	15 29 41.8	5 1 14.5	16 10.6	59 16.28	1.051	28.3		20	L	11 20.8	2.17
	20.5	22 37 37.8	4 57 45.1	16 6.8	59 2.42	1.255	28.8		20	U	23 47.0	2.20
	21.0	29 41 55.2	+4 49 42.0	16 2.4	58 46.24	-1.438	29.3				.....	...
	21.5	36 41 53.0	4 37 20.4	15 57.5	58 28.01	1.594	0.4		21	L	12 13.6	2.24
	22.0	43 36 56.8	4 21 0.6	15 52.0	58 8.10	1.719	0.9		22	U	0 40.7	2.27
	22.5	50 26 39.7	4 1 6.1	15 46.2	57 46.91	1.807	1.4		22	L	13 8.1	2.29
	23.0	57 10 42.9	3 38 2.9	15 40.2	57 24.87	1.859	1.9		23	U	1 35.7	2.30
	23.5	63 48 56.4	+3 12 18.8	15 34.1	57 2.44	-1.873	2.4		23	L	14 3.4	2.30
	24.0	70 21 18.3	+2 44 21.7	15 28.0	56 40.06	-1.850	2.9		24	U	2 31.0	2.29

## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	" " "	" " "	" "	" "	" "	d		h m	m	
Apr. 24.0	70 21 18.3	+2 44 21.7	15 28.0	56 40.06	-1.850	2.9	Apr. 24	U	2 31.0	2.29
24.5	76 47 55.2	2 14 39.5	15 22.1	56 18.17	1.792	3.4	24	L	14 58.4	2.27
25.0	83 9 1.0	1 43 38.7	15 16.4	55 57.17	1.703	3.9	25	U	3 25.4	2.23
25.5	89 24 55.8	1 11 45.0	15 11.0	55 37.42	1.584	4.4	25	L	15 51.9	2.18
26.0	95 36 5.8	0 39 22.0	15 6.0	55 19.26	1.439	4.9	26	U	4 17.7	2.12
26.5	101 43 1.4	+0 6 51.8	15 1.6	55 2.96	-1.274	5.4	26	L	16 42.8	2.06
27.0	107 46 16.8	-0 25 25.2	14 57.7	54 48.75	1.091	5.9	27	U	5 7.1	2.00
27.5	113 46 29.0	0 57 10.1	14 54.4	54 36.82	0.894	6.4	27	L	17 30.7	1.94
28.0	119 44 16.8	1 28 5.3	14 51.9	54 27.33	0.686	6.9	28	U	5 53.6	1.88
28.5	125 40 20.3	1 57 54.6	14 50.0	54 20.37	0.474	7.4	28	L	18 15.8	1.83
29.0	131 35 20.3	-2 26 22.2	14 48.8	54 15.99	-0.257	7.9	29	U	6 37.5	1.78
29.5	137 29 56.9	2 53 13.4	14 48.3	54 14.21	-0.039	8.4	29	L	18 58.6	1.75
30.0	143 24 50.0	3 18 13.7	14 48.5	54 15.03	+0.174	8.9	30	U	7 19.4	1.72
30.5	149 20 37.7	3 41 9.1	14 49.4	54 18.37	0.380	9.4	30	L	19 40.0	1.71
May 1.0	155 17 56.8	4 1 45.4	14 51.0	54 24.13	0.579	9.9	May 1	U	8 0.4	1.70
1.5	161 17 21.5	-4 19 49.2	14 53.2	54 32.22	+0.766	10.4	1	L	20 20.8	1.70
2.0	167 19 22.6	4 35 6.9	14 56.0	54 42.45	0.937	10.9	2	U	8 41.4	1.72
2.5	173 24 28.1	4 47 25.3	14 59.3	54 54.63	1.091	11.4	2	L	21 2.2	1.75
3.0	179 33 1.7	4 56 32.0	15 3.1	55 8.55	1.226	11.9	3	U	9 23.3	1.78
3.5	185 45 23.0	5 2 15.1	15 7.3	55 23.95	1.337	12.4	3	L	21 45.0	1.83
4.0	192 1 46.8	-5 4 24.3	15 11.8	55 40.55	+1.426	12.9	4	U	10 7.3	1.89
4.5	198 22 23.0	5 2 50.8	15 16.6	55 58.08	1.489	13.4	4	L	22 30.4	1.96
5.0	204 47 16.4	4 57 28.1	15 21.5	56 16.20	1.527	13.9	5	U	10 54.3	2.03
5.5	211 16 26.8	4 48 12.4	15 26.6	56 34.62	1.538	14.4	5	L	23 19.1	2.11
6.0	217 49 49.5	4 35 3.4	15 31.6	56 53.02	1.524	14.9	6	U	11 45.0	2.19
6.5	224 27 15.1	-4 18 4.0	15 36.5	57 11.09	+1.484	15.4			.....	...
7.0	231 8 30.3	3 57 21.8	15 41.2	57 28.55	1.422	15.9	7	L	0 11.8	2.27
7.5	237 53 19.1	3 33 8.4	15 45.8	57 45.15	1.341	16.4	7	U	12 39.5	2.35
8.0	244 41 23.1	3 5 40.0	15 50.0	58 0.66	1.242	16.9	8	L	1 8.1	2.41
8.5	251 32 22.6	2 35 17.0	15 53.9	58 14.91	1.131	17.4	8	U	13 37.4	2.46
9.0	258 25 57.0	-2 2 24.1	15 57.4	58 27.76	+1.010	17.9	9	L	2 7.1	2.49
9.5	265 21 46.9	1 27 29.4	16 0.5	58 39.13	0.884	18.4	9	U	14 36.9	2.49
10.0	272 19 33.2	0 51 4.0	16 3.2	58 48.98	0.757	18.9	10	L	3 6.8	2.47
10.5	279 18 58.8	-0 13 41.6	16 5.4	58 57.29	0.628	19.4	10	U	15 36.3	2.44
11.0	286 19 48.0	+0 24 2.7	16 7.3	59 4.08	0.504	19.9	11	L	4 5.3	2.39
11.5	293 21 47.0	+1 1 33.0	16 8.7	59 9.42	+0.385	20.4	11	U	16 33.7	2.33
12.0	300 24 44.0	1 38 13.2	16 9.8	59 13.35	0.271	20.9	12	L	5 1.3	2.27
12.5	307 28 28.0	2 13 27.9	16 10.5	59 15.95	0.162	21.4	12	U	17 28.2	2.21
13.0	314 32 49.0	2 46 43.3	16 10.9	59 17.26	+0.056	21.9	13	L	5 54.4	2.16
13.5	321 37 36.6	3 17 27.1	16 10.9	59 17.32	-0.046	22.4	13	U	18 20.0	2.11
14.0	328 42 40.4	+3 45 10.0	16 10.6	59 16.16	-0.148	22.9	14	L	6 45.1	2.07
14.5	335 47 48.4	4 9 25.6	16 9.9	59 13.78	0.249	23.4	14	U	19 9.9	2.05
15.0	342 52 46.8	4 29 51.2	16 8.9	59 10.19	0.350	23.9	15	L	7 34.3	2.04
15.5	349 57 19.4	4 46 7.8	16 7.6	59 5.35	0.456	24.4	15	U	19 58.7	2.03
16.0	357 1 7.8	4 58 1.4	16 6.0	58 59.21	0.565	24.9	16	L	8 23.2	2.04
16.5	4 3 51.1	+5 5 22.2	16 3.9	58 51.76	-0.677	25.4	16	U	20 47.8	2.06
17.0	11 5 5.8	+5 8 5.9	16 1.5	58 42.95	-0.792	25.9	17	L	9 12.7	2.09



## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.	
	" ' "	" ' "	" "	" "	"	d		h m	m		
May	17.0	11 5 5.8	+5 8 5.9	16 1.5	58 42.95	-0.792	25.9	May 17	L	9 12.7	2.09
	17.5	18 4 27.3	5 6 13.0	15 58.8	58 32.76	0.905	26.4	17	U	21 37.9	2.12
	18.0	25 1 29.8	4 59 49.0	15 55.6	58 21.22	1.019	26.9	18	L	10 3.7	2.16
	18.5	31 55 47.1	4 49 4.5	15 52.1	58 8.34	1.126	27.4	18	U	22 29.9	2.20
	19.0	38 46 54.4	4 34 14.4	15 48.2	57 54.21	1.227	27.9	19	L	10 56.5	2.24
	19.5	45 34 28.1	+4 15 37.5	15 44.1	57 38.94	-1.315	28.4	19	U	23 23.6	2.27
	20.0	52 18 8.3	3 53 36.1	15 39.7	57 22.69	1.390	28.9				
	20.5	58 57 37.8	3 28 34.8	15 35.0	57 5.65	1.447	29.4	20	L	11 51.1	2.29
	21.0	65 32 44.4	3 1 0.2	15 30.2	56 48.06	1.482	0.5	21	U	0 18.7	2.30
	21.5	72 3 20.5	2 31 19.5	15 25.4	56 30.19	1.494	1.0	21	L	12 46.3	2.30
	22.0	78 29 23.5	+2 0 0.7	15 20.5	56 12.31	-1.482	1.5	22	U	1 13.7	2.27
	22.5	84 50 56.3	1 27 31.1	15 15.7	55 54.71	1.446	2.0	22	L	13 40.8	2.24
	23.0	91 8 6.7	0 54 16.9	15 11.0	55 37.71	1.384	2.5	23	U	2 7.4	2.19
	23.5	97 21 7.6	+0 20 43.2	15 6.6	55 21.59	1.299	3.0	23	L	14 33.3	2.13
	24.0	103 30 16.3	-0 12 46.4	15 2.6	55 6.63	1.192	3.5	24	U	2 58.5	2.07
	24.5	109 35 54.6	-0 45 49.9	14 58.9	54 53.09	-1.061	4.0	24	L	15 22.9	2.00
	25.0	115 38 27.7	1 18 7.4	14 55.6	54 41.24	0.912	4.5	25	U	3 46.6	1.94
	25.5	121 38 24.4	1 49 20.1	14 52.9	54 31.28	0.745	5.0	25	L	16 9.5	1.88
	26.0	127 36 15.8	2 19 11.1	14 50.8	54 23.44	0.562	5.5	26	U	4 31.7	1.82
	26.5	133 32 35.9	2 47 24.7	14 49.3	54 17.86	0.367	6.0	26	L	16 53.3	1.78
	27.0	139 27 59.8	-3 13 46.3	14 48.4	54 14.67	-0.163	6.5	27	U	5 14.4	1.74
27.5	145 23 4.2	3 38 2.0	14 48.2	54 13.96	+0.047	7.0	27	L	17 35.2	1.71	
28.0	151 18 26.5	3 59 59.1	14 48.7	54 15.83	0.264	7.5	28	U	5 55.6	1.69	
28.5	157 14 44.2	4 19 24.9	14 50.0	54 20.29	0.480	8.0	28	L	18 15.9	1.69	
29.0	163 12 34.5	4 36 7.3	14 51.9	54 27.32	0.692	8.5	29	U	6 36.1	1.69	
29.5	169 12 34.1	-4 49 54.7	14 54.5	54 36.87	+0.900	9.0	29	L	18 56.5	1.71	
30.0	175 15 17.8	5 0 35.6	14 57.7	54 48.88	1.099	9.5	30	U	7 17.1	1.73	
30.5	181 21 19.0	5 7 59.1	15 1.6	55 3.19	1.285	10.0	30	L	19 38.1	1.77	
31.0	187 31 7.8	5 11 54.9	15 6.1	55 19.64	1.452	10.5	31	U	7 59.7	1.82	
31.5	193 45 11.3	5 12 13.6	15 11.1	55 37.97	1.600	11.0	31	L	20 21.9	1.88	
June	1.0	200 3 52.9	-5 8 46.8	15 16.6	55 57.95	+1.725	11.5	June 1	U	8 44.9	1.95
	1.5	206 27 30.9	5 1 28.1	15 22.4	56 19.24	1.818	12.0	1	L	21 8.8	2.03
	2.0	212 56 18.8	4 50 13.6	15 28.4	56 41.47	1.882	12.5	2	U	9 33.8	2.12
	2.5	219 30 23.8	4 35 1.8	15 34.6	57 4.26	1.910	13.0	2	L	21 59.8	2.21
	3.0	226 9 47.6	4 15 55.2	15 40.9	57 27.16	1.900	13.5	3	U	10 26.9	2.30
	3.5	232 54 25.0	-3 53 0.7	15 47.0	57 49.71	+1.851	14.0	3	L	22 55.0	2.39
	4.0	239 44 5.0	3 26 29.4	15 52.9	58 11.44	1.765	14.5	4	U	11 24.2	2.46
	4.5	246 38 29.8	2 56 38.0	15 58.5	58 31.93	1.643	15.0	4	L	23 54.1	2.52
	5.0	253 37 16.5	2 23 48.2	16 3.6	58 50.72	1.484	15.5	5	U	12 24.5	2.55
	5.5	260 39 57.1	1 48 27.2	16 8.2	59 7.44	1.298	16.0				
	6.0	267 45 59.4	-1 11 6.9	16 12.1	59 21.77	+1.088	16.5	6	L	0 55.1	2.56
	6.5	274 54 48.5	-0 32 23.3	16 15.3	59 33.48	0.862	17.0	6	U	13 25.7	2.54
	7.0	282 5 47.5	+0 7 4.4	16 17.7	59 42.40	0.623	17.5	7	L	1 55.9	2.51
	7.5	289 18 19.2	0 46 35.4	16 19.4	59 48.46	0.387	18.0	7	U	14 25.6	2.45
8.0	296 31 46.2	1 25 27.6	16 20.3	59 51.70	+0.154	18.5	8	L	2 54.6	2.38	
8.5	303 45 33.2	+2 3 0.1	16 20.4	59 52.20	-0.067	19.0	8	U	15 22.7	2.31	
9.0	310 59 6.9	+2 38 33.9	16 19.8	59 50.17	-0.270	19.5	9	L	3 50.0	2.22	



## GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
		" ' "	" ' "	" "	" "	" "	d			h m	m	
June	9.0	310 59 6.9	+2 38 33.9	16 19.8	59 50.17	-0.270	19.5	June 9	L	3 50.0	2.34	
	9.5	318 11 56.6	3 11 32.4	16 18.6	59 45.79	0.455	20.0	9	U	16 16.5	2.18	
	10.0	325 23 35.2	3 41 23.6	16 16.9	59 39.35	0.615	20.5	10	L	4 42.2	2.13	
	10.5	332 33 38.6	4 7 39.7	16 14.6	59 31.12	0.753	21.0	10	U	17 7.4	2.08	
	11.0	339 41 46.1	4 29 57.8	16 12.0	59 21.38	0.968	21.5	11	L	5 32.2	2.05	
	11.5	346 47 39.9	+4 48 0.2	16 9.0	59 10.38	-0.961	22.0	11	U	17 56.6	2.03	
	12.0	353 51 5.3	5 1 34.3	16 5.7	58 58.38	1.087	22.5	12	L	6 20.9	2.02	
	12.5	0 51 49.8	5 10 32.6	16 2.2	58 45.57	1.096	23.0	12	U	18 45.2	2.03	
	13.0	7 49 42.8	5 14 52.4	15 58.6	58 32.15	1.140	23.5	13	L	7 9.6	2.04	
	13.5	14 44 35.7	5 14 35.8	15 54.8	58 18.26	1.173	24.0	13	U	19 34.2	2.07	
	14.0	21 36 21.0	+5 9 48.9	15 50.9	58 4.02	-1.199	24.5	14	L	7 59.2	2.10	
	14.5	28 24 52.3	5 0 41.5	15 47.0	57 49.50	1.220	25.0	14	U	20 24.6	2.13	
	15.0	35 10 4.5	4 47 27.3	15 43.0	57 34.77	1.236	25.5	15	L	8 50.4	2.17	
	15.5	41 51 52.7	4 30 23.1	15 38.9	57 19.87	1.247	26.0	15	U	21 16.7	2.21	
	16.0	48 30 13.4	4 9 48.3	15 34.8	57 4.86	1.254	26.5	16	L	9 43.4	2.24	
	16.5	55 5 3.5	+3 46 4.5	15 30.7	56 49.80	-1.257	27.0	16	U	22 10.4	2.26	
	17.0	61 36 21.4	3 19 35.1	15 26.6	56 34.72	1.257	27.5	17	L	10 37.6	2.27	
	17.5	68 4 6.1	2 50 45.1	15 22.5	56 19.66	1.250	28.0	17	U	23 4.8	2.27	
	18.0	74 28 18.6	2 20 0.0	15 18.4	56 4.75	1.234	28.5	18	L	11 31.9	2.25	
	18.5	80 49 0.9	1 47 46.1	15 14.4	55 50.06	1.211	29.0	18	U	23 58.7	2.22	
	19.0	87 6 17.3	+1 14 29.3	15 10.5	55 35.73	-1.176	29.5			.....	...	
	19.5	93 20 14.1	0 40 35.2	15 6.7	55 21.88	1.129	0.5	19	L	12 25.0	2.17	
	20.0	99 30 59.5	+0 6 28.7	15 3.1	55 8.68	1.099	1.0	20	U	0 50.7	2.11	
	20.5	105 38 44.4	-0 27 26.8	14 59.8	54 56.28	0.995	1.5	20	L	13 15.7	2.06	
	21.0	111 43 41.8	1 0 48.7	14 56.6	54 44.87	0.905	2.0	21	U	1 40.0	2.00	
	21.5	117 46 7.4	-1 33 16.2	14 53.9	54 34.63	-0.799	2.5	21	L	14 3.6	1.93	
	22.0	123 46 19.0	2 4 29.9	14 51.4	54 25.76	0.676	3.0	22	U	2 26.4	1.87	
	22.5	129 44 37.4	2 34 12.1	14 49.4	54 18.45	0.540	3.5	22	L	14 48.5	1.82	
	23.0	135 41 25.5	3 2 6.4	14 47.9	54 12.86	0.388	4.0	23	U	3 10.1	1.77	
	23.5	141 37 8.5	3 27 57.9	14 46.9	54 9.18	0.223	4.5	23	L	15 31.1	1.73	
	24.0	147 32 13.4	-3 51 33.0	14 46.5	54 7.56	-0.046	5.0	24	U	3 51.7	1.71	
	24.5	153 27 9.6	4 12 39.2	14 46.6	54 8.13	+0.144	5.5	24	L	16 12.0	1.69	
	25.0	159 22 27.8	4 31 4.8	14 47.4	54 11.03	0.341	6.0	25	U	4 32.2	1.68	
	25.5	165 18 40.6	4 46 39.1	14 48.9	54 16.33	0.544	6.5	25	L	16 52.3	1.68	
	26.0	171 16 21.1	4 59 12.0	14 51.0	54 24.12	0.755	7.0	26	U	5 12.5	1.69	
	26.5	177 16 3.2	-5 8 34.1	14 53.8	54 34.44	+0.966	7.5	26	L	17 32.9	1.71	
	27.0	183 18 21.5	5 14 36.5	14 57.3	54 47.27	1.171	8.0	27	U	5 53.6	1.75	
	27.5	189 23 50.2	5 17 11.0	15 1.4	55 2.53	1.373	8.5	27	L	18 14.9	1.79	
	28.0	195 33 2.4	5 16 10.0	15 6.3	55 20.18	1.566	9.0	28	U	6 36.8	1.85	
	28.5	201 46 30.0	5 11 27.2	15 11.7	55 40.05	1.743	9.5	28	L	18 59.4	1.93	
	29.0	208 4 43.0	-5 2 57.2	15 17.6	56 1.95	+1.902	10.0	29	U	7 23.0	2.01	
	29.5	214 28 8.2	4 50 36.6	15 24.1	56 25.61	2.035	10.5	29	L	19 47.6	2.09	
	30.0	220 57 8.4	4 34 24.2	15 30.9	56 50.67	2.138	11.0	30	U	8 13.2	2.18	
	30.5	227 32 2.1	4 14 21.7	15 38.0	57 16.78	2.207	11.5	30	L	20 40.1	2.27	
July	1.0	234 13 1.9	3 50 34.3	15 45.3	57 43.47	2.234	12.0	July 1	U	9 8.0	2.37	
	1.5	241 0 13.6	-3 23 11.4	15 52.6	58 10.21	+2.215	12.5	1	L	21 37.0	2.46	
	2.0	247 53 36.3	-2 52 27.7	15 59.7	58 36.44	+2.148	13.0	2	U	10 6.9	2.52	

GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
		° ' "	° ' "	' "	' "	"	d					m
July	1.0	234 13 1.9	-3 50 34.3	15 45.3	57 43.47	+2.234	12.0	July 1	U	9 8.0		2.37
	1.5	241 0 13.6	3 23 11.4	15 52.6	58 10.21	2.215	12.5	1	L	21 37.0		2.46
	2.0	247 53 36.3	2 52 27.7	15 59.7	58 36.44	2.148	13.0	2	U	10 6.9		2.52
	2.5	254 53 0.5	2 18 42.9	16 6.6	59 1.56	2.080	13.5	2	L	22 37.4		2.57
	3.0	261 58 8.7	1 42 22.6	16 13.0	59 24.97	1.863	14.0	3	U	11 8.4		2.59
	3.5	269 8 34.5	-1 3 58.5	16 18.7	59 46.07	+1.646	14.5	3	L	23 39.4		2.58
	4.0	276 23 44.0	-0 24 7.2	16 23.7	60 4.31	1.888	15.0	4	U	12 10.2		2.55
	4.5	283 42 55.3	+0 16 29.9	16 27.8	60 19.24	1.094	15.5			.....		...
	5.0	291 5 19.9	0 57 8.1	16 30.8	60 30.46	0.773	16.0	5	L	0 40.6		2.50
	5.5	298 30 4.6	1 37 0.8	16 32.8	60 37.75	0.440	16.5	5	U	13 10.5		2.44
	6.0	305 56 12.9	+2 15 21.6	16 33.7	60 40.99	+0.101	17.0	6	L	1 39.1		2.37
	6.5	313 22 46.9	2 51 25.9	16 33.5	60 40.20	-0.229	17.5	6	U	14 7.2		2.30
	7.0	320 48 49.2	3 24 32.5	16 32.2	60 35.56	0.539	18.0	7	L	2 34.5		2.24
	7.5	328 13 25.2	3 54 5.8	16 30.0	60 27.38	0.820	18.5	7	U	15 1.0		2.18
	8.0	335 35 44.5	4 19 35.9	16 26.9	60 16.02	1.068	19.0	8	L	3 26.9		2.13
	8.5	342 55 2.7	+4 40 40.0	16 23.1	60 1.92	-1.275	19.5	8	U	15 52.3		2.10
	9.0	350 10 41.8	4 57 2.4	16 18.6	59 45.59	1.442	20.0	9	L	4 17.3		2.08
	9.5	357 22 11.3	5 8 34.4	16 13.7	59 27.49	1.568	20.5	9	U	16 42.2		2.06
	10.0	4 29 8.3	5 15 13.6	16 8.4	59 8.12	1.654	21.0	10	L	5 6.9		2.06
	10.5	11 31 17.0	5 17 3.1	16 2.9	58 47.95	1.705	21.5	10	U	17 31.7		2.07
	11.0	18 28 28.5	+5 14 11.5	15 57.3	58 27.33	-1.726	22.0	11	L	5 56.7		2.09
	11.5	25 20 40.0	5 6 51.0	15 51.6	58 6.64	1.720	22.5	11	U	18 21.9		2.11
	12.0	32 7 53.5	4 55 17.3	15 46.1	57 46.15	1.692	23.0	12	L	6 47.5		2.14
	12.5	38 50 15.6	4 39 48.6	15 40.6	57 26.10	1.647	23.5	12	U	19 13.4		2.17
	13.0	45 27 56.4	4 20 45.3	15 35.3	57 6.67	1.591	24.0	13	L	7 39.6		2.20
	13.5	52 1 7.9	+3 58 29.2	15 30.2	56 47.97	-1.524	24.5	13	U	20 6.1		2.22
	14.0	58 30 4.3	3 33 23.1	15 25.3	56 30.11	1.454	25.0	14	L	8 32.9		2.24
	14.5	64 55 0.8	3 5 50.5	15 20.7	56 13.11	1.379	25.5	14	U	20 59.7		2.24
	15.0	71 16 12.2	2 36 15.6	15 16.3	55 57.02	1.303	26.0	15	L	9 26.6		2.23
	15.5	77 33 56.1	2 5 2.6	15 12.2	55 41.85	1.226	26.5	15	U	21 53.2		2.21
	16.0	83 48 26.2	+1 32 35.5	15 8.3	55 27.59	-1.150	27.0	16	L	10 19.5		2.18
	16.5	89 59 58.0	0 59 18.5	15 4.6	55 14.26	1.071	27.5	16	U	22 45.4		2.13
	17.0	96 8 46.2	+0 25 35.3	15 1.3	55 1.88	0.993	28.0	17	L	11 10.6		2.08
	17.5	102 15 5.1	-0 8 11.3	14 58.2	54 50.43	0.913	28.5	17	U	23 35.3		2.02
	18.0	108 19 8.4	0 41 38.8	14 55.3	54 39.99	0.829	29.0			.....		...
	18.5	114 21 9.8	-1 14 26.1	14 52.7	54 30.56	-0.742	29.5	18	L	11 59.2		1.97
	19.0	120 21 23.1	1 46 12.6	14 50.5	54 22.20	0.649	0.4	19	U	0 22.5		1.91
	19.5	126 20 2.5	2 16 39.4	14 48.5	54 15.00	0.549	0.9	19	L	12 45.1		1.85
	20.0	132 17 22.5	2 45 28.6	14 46.9	54 9.05	0.441	1.4	20	U	1 7.0		1.80
	20.5	138 13 38.5	3 12 23.8	14 45.6	54 4.44	0.325	1.9	20	L	13 28.4		1.76
	21.0	144 9 6.8	-3 37 9.7	14 44.8	54 1.29	-0.199	2.4	21	U	1 49.3		1.73
	21.5	150 4 5.1	3 59 32.7	14 44.3	53 59.71	-0.063	2.9	21	L	14 9.8		1.70
	22.0	155 58 52.5	4 19 20.5	14 44.4	53 59.83	+0.084	3.4	22	U	2 30.1		1.68
	22.5	161 53 49.6	4 36 21.8	14 44.9	54 1.78	0.243	3.9	22	L	14 50.2		1.67
	23.0	167 49 19.0	4 50 26.8	14 46.0	54 5.70	0.411	4.4	23	U	3 10.2		1.67
	23.5	173 45 44.6	-5 1 26.4	14 47.6	54 11.67	+0.587	4.9	23	L	15 30.3		1.68
	24.0	179 43 32.4	-5 9 13.3	14 49.8	54 19.81	+0.771	5.4	24	U	3 50.6		1.70

## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
	" ' "	" ' "	" "	" "	"	d			h m	m	
uly 24.0	179 43 32.4	-5 9 13.3	14 49.8	54 19.81	+0.771	5.4	July 24	U	3 50.6	1.70	
24.5	185 43 10.0	5 13 40.6	14 52.6	54 30.20	0.961	5.9	24	L	16 11.2	1.73	
25.0	191 45 6.4	5 14 42.2	14 56.1	54 42.89	1.155	6.4	25	U	4 32.2	1.78	
25.5	197 49 52.0	5 12 13.3	15 0.2	54 57.92	1.351	6.9	25	L	16 53.8	1.83	
26.0	203 57 57.8	5 6 10.3	15 4.9	55 15.28	1.542	7.4	26	U	5 16.2	1.89	
26.5	210 9 55.9	-4 56 30.5	15 10.3	55 34.91	+1.728	7.9	26	L	17 39.3	1.96	
27.0	216 26 17.6	4 43 12.6	15 16.2	55 56.71	1.903	8.4	27	U	6 3.4	2.05	
27.5	222 47 33.9	4 26 17.3	15 22.7	56 20.52	2.062	8.9	27	L	18 28.5	2.14	
28.0	229 14 13.9	4 5 47.2	15 29.7	56 46.10	2.198	9.4	28	U	6 54.7	2.23	
28.5	235 46 44.4	3 41 47.9	15 37.1	57 13.15	2.306	9.9	28	L	19 21.9	2.31	
29.0	242 25 28.4	-3 14 28.0	15 44.7	57 41.30	+2.379	10.4	29	U	7 50.2	2.40	
29.5	249 10 44.2	2 44 0.3	15 52.6	58 10.07	2.408	10.9	29	L	20 19.4	2.47	
30.0	256 2 43.6	2 10 41.8	16 0.4	58 38.91	2.391	11.4	30	U	8 49.4	2.52	
30.5	263 1 30.8	1 34 54.9	16 8.1	59 7.23	2.320	11.9	30	L	21 19.8	2.55	
31.0	270 7 1.8	0 57 7.3	16 15.5	59 34.36	2.191	12.4	31	U	9 50.5	2.56	
31.5	277 19 1.8	-0 17 52.3	16 22.4	59 59.58	+2.002	12.9	31	L	22 21.2	2.58	
Aug. 1.0	284 37 5.7	+0 22 11.6	16 28.6	60 22.19	1.758	13.4	Aug. 1	U	10 51.6	2.52	
1.5	292 0 37.1	1 2 21.2	16 33.8	60 41.55	1.460	13.9	1	L	23 21.5	2.47	
2.0	299 28 48.5	1 41 49.9	16 38.1	60 57.04	1.116	14.4	2	U	11 50.8	2.41	
2.5	307 0 42.6	2 19 49.7	16 41.1	61 8.18	0.735	14.9			.....	...	
3.0	314 35 13.5	+2 55 32.9	16 42.9	61 14.62	+0.336	15.4	3	L	0 19.5	2.36	
3.5	322 11 8.7	3 28 14.2	16 43.3	61 16.21	-0.071	15.9	3	U	12 47.4	2.30	
4.0	329 47 12.7	3 57 13.2	16 42.4	61 12.94	0.472	16.4	4	L	1 14.7	2.25	
4.5	337 22 9.4	4 21 55.8	16 40.2	61 4.98	0.849	16.9	4	U	13 41.5	2.21	
5.0	344 54 45.4	4 41 56.0	16 36.9	60 52.72	1.189	17.4	5	L	2 7.8	2.18	
5.5	352 23 53.6	+4 56 56.2	16 32.5	60 36.62	-1.486	17.9	5	U	14 33.8	2.15	
6.0	359 48 34.8	5 6 47.8	16 27.2	60 17.26	1.732	18.4	6	L	2 59.5	2.14	
6.5	7 8 0.1	5 11 30.3	16 21.2	59 55.27	1.922	18.9	6	U	15 25.2	2.14	
7.0	14 21 32.1	5 11 10.4	16 14.7	59 31.34	2.058	19.4	7	L	3 50.9	2.15	
7.5	21 28 44.8	5 6 1.2	16 7.8	59 6.06	2.145	19.9	7	U	16 16.8	2.16	
8.0	28 29 23.3	+4 56 20.4	16 0.7	58 40.06	-2.181	20.4	8	L	4 42.8	2.18	
8.5	35 23 23.2	4 42 29.2	15 53.6	58 13.89	2.174	20.9	8	U	17 9.0	2.20	
9.0	42 10 49.4	4 24 51.3	15 46.6	57 48.03	2.132	21.4	9	L	5 35.5	2.22	
9.5	48 51 54.0	4 3 51.8	15 39.7	57 22.85	2.061	21.9	9	U	18 2.2	2.23	
10.0	55 26 55.3	3 39 56.3	15 33.1	56 58.66	1.966	22.4	10	L	6 29.1	2.24	
10.5	61 56 16.3	+3 13 30.3	15 26.9	56 35.74	-1.853	22.9	10	U	18 56.0	2.24	
11.0	68 20 23.2	2 44 59.1	15 21.0	56 14.24	1.729	23.4	11	L	7 22.9	2.23	
11.5	74 39 43.9	2 14 47.4	15 15.6	55 54.28	1.596	23.9	11	U	19 49.6	2.21	
12.0	80 54 47.7	1 43 19.3	15 10.6	55 35.95	1.459	24.4	12	L	8 16.0	2.18	
12.5	87 6 3.6	1 10 58.0	15 6.0	55 19.27	1.322	24.9	12	U	20 41.9	2.14	
13.0	93 14 0.0	+0 38 5.8	15 1.9	55 4.23	-1.187	25.4	13	L	9 7.4	2.10	
13.5	99 19 4.4	+0 5 4.4	14 58.2	54 50.78	1.053	25.9	13	U	21 32.3	2.04	
14.0	105 21 42.5	-0 27 45.4	14 55.0	54 38.94	0.922	26.4	14	L	9 56.5	1.99	
14.5	111 22 18.1	1 0 3.4	14 52.2	54 28.62	0.798	26.9	14	U	22 20.0	1.93	
15.0	117 21 13.2	1 31 30.2	14 49.8	54 19.77	0.678	27.4	15	L	10 42.9	1.88	
15.5	123 18 48.0	-2 1 47.2	14 47.8	54 12.33	-0.562	27.9	15	U	23 5.2	1.83	
16.0	129 15 20.7	-2 30 36.8	14 46.1	54 6.27	-0.449	28.4	16	L	11 26.9	1.79	

## GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
		" ' "	" ' "	" "	" "	"	d			h m	m
Aug.	16.0	129 15 20.7	-2 30 36.8	14 46.1	54 6.27	-0.449	28.4	Aug. 16	L	11 26.9	1.79
	16.5	135 11 7.8	2 57 42.4	14 44.8	54 1.55	0.338	28.9	16	U	23 48.1	1.75
	17.0	141 6 24.7	3 22 47.9	14 43.9	53 58.15	0.227	29.4			.....	...
	17.5	147 1 25.4	3 45 39.1	14 43.4	53 56.11	0.115	0.2	17	L	12 8.9	1.72
	18.0	152 56 23.4	4 6 2.5	14 43.2	53 55.38	-0.004	0.7	18	U	0 29.3	1.69
	18.5	158 51 31.8	-4 23 45.9	14 43.3	53 56.02	+0.112	1.2	18	L	12 49.5	1.68
	19.0	164 47 3.6	4 38 38.7	14 43.9	53 58.10	0.234	1.7	19	U	1 9.6	1.67
	19.5	170 43 12.4	4 50 31.5	14 44.9	54 1.65	0.359	2.2	19	L	13 29.7	1.67
	20.0	176 40 12.4	4 59 16.3	14 46.2	54 6.75	0.492	2.7	20	U	1 49.9	1.68
	20.5	182 38 19.0	5 4 46.7	14 48.1	54 13.48	0.631	3.2	20	L	14 10.2	1.71
	21.0	188 37 49.3	-5 6 57.5	14 50.4	54 21.92	+0.777	3.7	21	U	2 30.9	1.74
	21.5	194 39 1.8	5 5 45.1	14 53.2	54 32.15	0.929	4.2	21	L	14 52.0	1.78
	22.0	200 42 17.0	5 1 7.3	14 56.5	54 44.25	1.087	4.7	22	U	3 13.6	1.83
	22.5	206 47 57.4	4 53 3.1	15 0.3	54 58.27	1.249	5.2	22	L	15 35.9	1.89
	23.0	212 56 27.4	4 41 33.2	15 4.6	55 14.25	1.415	5.7	23	U	3 58.9	1.95
	23.5	219 8 13.2	-4 26 39.7	15 9.5	55 32.22	+1.580	6.2	23	L	16 22.7	2.02
	24.0	225 23 42.3	4 8 26.5	15 15.0	55 52.15	1.740	6.7	24	U	4 47.4	2.10
	24.5	231 43 23.4	3 46 59.3	15 20.9	56 13.96	1.893	7.2	24	L	17 13.1	2.18
	25.0	238 7 45.6	3 22 26.0	15 27.4	56 37.54	2.034	7.7	25	U	5 39.7	2.26
	25.5	244 37 17.9	2 54 57.1	15 34.2	57 2.70	2.157	8.2	25	L	18 7.2	2.32
	26.0	251 12 27.6	-2 24 45.8	15 41.4	57 29.20	+2.255	8.7	26	U	6 35.5	2.38
	26.5	257 53 39.9	1 52 8.8	15 48.9	57 56.71	2.322	9.2	26	L	19 4.5	2.43
	27.0	264 41 16.0	1 17 26.7	15 56.6	58 24.79	2.351	9.7	27	U	7 33.9	2.46
	27.5	271 35 32.0	0 41 4.1	16 4.3	58 52.96	2.335	10.2	27	L	20 3.6	2.48
	28.0	278 36 36.6	-0 3 30.1	16 11.8	59 20.64	2.269	10.7	28	U	8 33.3	2.48
	28.5	285 44 29.9	+0 34 41.6	16 19.0	59 47.19	+2.146	11.2	28	L	21 2.9	2.46
	29.0	292 59 1.7	1 12 53.0	16 25.8	60 11.91	1.965	11.7	29	U	9 32.3	2.43
	29.5	300 19 49.7	1 50 22.6	16 31.8	60 34.10	1.724	12.2	29	L	22 1.2	2.39
	30.0	307 46 19.1	2 26 26.0	16 37.0	60 53.06	1.426	12.7	30	U	10 29.6	2.35
	30.5	315 17 42.2	3 0 17.9	16 41.1	61 8.14	1.078	13.2	30	L	22 57.6	2.31
	31.0	322 52 58.9	+3 31 13.9	16 44.0	61 18.79	+0.691	13.7	31	U	11 25.1	2.27
	31.5	330 30 58.1	3 58 32.5	16 45.6	61 24.63	+0.278	14.2	31	L	23 52.2	2.24
Sept.	1.0	338 10 20.6	4 21 37.2	16 45.8	61 25.42	-0.149	14.7	Sept. 1	U	12 19.0	2.22
	1.5	345 49 41.8	4 39 58.5	16 44.6	61 21.09	0.571	15.2			.....	...
	2.0	353 27 36.2	4 53 15.5	16 42.1	61 11.79	0.974	15.7	2	L	0 45.6	2.21
	2.5	1 2 40.9	+5 1 16.6	16 38.3	60 57.85	-1.342	16.2	2	U	13 12.2	2.21
	3.0	8 33 39.7	5 3 59.8	16 33.4	60 39.77	1.663	16.7	3	L	1 38.7	2.22
	3.5	15 59 25.9	5 1 31.6	16 27.5	60 18.15	1.931	17.2	3	U	14 5.4	2.23
	4.0	23 19 5.1	4 54 6.5	16 20.8	59 53.66	2.140	17.7	4	L	2 32.2	2.24
	4.5	30 31 56.3	4 42 5.2	16 13.5	59 27.02	2.289	18.2	4	U	14 59.2	2.26
	5.0	37 37 32.7	+4 25 52.9	16 5.9	58 58.97	-2.377	18.7	5	L	3 26.5	2.28
	5.5	44 35 40.5	4 5 57.9	15 58.0	58 30.19	2.410	19.2	5	U	15 53.9	2.29
	6.0	51 26 18.4	3 42 49.8	15 50.2	58 1.32	2.394	19.7	6	L	4 21.5	2.30
	6.5	58 9 35.9	3 16 58.8	15 42.4	57 32.90	2.336	20.2	6	U	16 49.1	2.30
	7.0	64 45 51.2	2 48 54.4	15 35.0	57 5.41	2.242	20.7	7	L	5 16.7	2.29
	7.5	71 15 29.9	+2 19 4.9	15 27.8	56 39.22	-2.119	21.2	7	U	17 44.0	2.27
	8.0	77 39 2.4	+1 47 57.3	15 21.1	56 14.64	-1.974	21.7	8	L	6 11.0	2.23

## GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
		" ' "	" ' "	" "	" "	"	d			h m	m
Sept.	8.0	77 39 2.4	+1 47 57.3	15 21.1	56 14.64	-1.974	21.7	Sept. 8	L	6 11.0	2.23
	8.5	83 57 3.1	1 15 56.8	15 14.9	55 51.91	1.813	22.2	8	U	18 37.6	2.19
	9.0	90 10 8.4	0 43 27.1	15 9.3	55 31.18	1.641	22.7	9	L	7 3.6	2.14
	9.5	96 18 55.7	+0 10 49.9	15 4.2	55 12.55	1.463	23.2	9	U	19 28.9	2.08
	10.0	102 24 2.4	-0 21 34.2	14 59.7	54 56.07	1.283	23.7	10	L	7 53.6	2.02
	10.5	108 26 5.1	-0 53 25.7	14 55.8	54 41.75	-1.103	24.2	10	U	20 17.5	1.96
	11.0	114 25 38.9	1 24 26.6	14 52.5	54 29.57	0.928	24.7	11	L	8 40.8	1.91
	11.5	120 23 16.8	1 54 19.6	14 49.7	54 19.46	0.760	25.2	11	U	21 3.4	1.86
	12.0	126 19 29.3	2 22 48.4	14 47.5	54 11.33	0.597	25.7	12	L	9 25.4	1.81
	12.5	132 14 44.4	2 49 37.4	14 45.8	54 5.10	0.443	26.2	12	U	21 46.9	1.77
	13.0	138 9 27.3	-3 14 31.6	14 44.6	54 0.68	-0.297	26.7	13	L	10 7.9	1.74
	13.5	144 4 0.3	3 37 17.1	14 43.9	53 57.96	0.159	27.2	13	U	22 28.6	1.71
	14.0	149 58 43.1	3 57 40.5	14 43.6	53 56.84	-0.030	27.7	14	L	10 49.0	1.69
	14.5	155 53 52.5	4 15 29.5	14 43.7	53 57.21	+0.091	28.2	14	U	23 9.2	1.68
	15.0	161 49 43.1	4 30 33.0	14 44.2	53 59.00	0.206	28.7	15	L	11 29.4	1.68
	15.5	167 46 27.6	-4 42 40.7	14 45.0	54 2.13	+0.316	29.2	15	U	23 49.6	1.69
	16.0	173 44 16.7	4 51 44.1	14 46.2	54 6.55	0.421	0.1			.....	...
	16.5	179 43 20.1	4 57 35.8	14 47.8	54 12.22	0.523	0.6	16	L	12 9.9	1.70
	17.0	185 43 46.7	5 0 10.3	14 49.6	54 19.11	0.625	1.1	17	U	0 30.5	1.73
	17.5	191 45 45.0	4 59 23.6	14 51.8	54 27.22	0.726	1.6	17	L	12 51.5	1.76
	18.0	197 49 23.7	-4 55 13.6	14 54.4	54 36.54	+0.828	2.1	18	U	1 12.9	1.80
	18.5	203 54 52.6	4 47 40.0	14 57.2	54 47.10	0.933	2.6	18	L	13 34.8	1.85
	19.0	210 2 22.4	4 36 44.8	15 0.5	54 58.93	1.039	3.1	19	U	1 57.4	1.91
	19.5	216 12 5.3	4 22 31.5	15 4.0	55 12.06	1.150	3.6	19	L	14 20.7	1.97
	20.0	222 24 15.7	4 5 5.7	15 8.0	55 26.53	1.263	4.1	20	U	2 44.7	2.04
	20.5	228 39 9.7	-3 44 35.2	15 12.3	55 42.36	+1.376	4.6	20	L	15 9.6	2.10
	21.0	234 57 5.9	3 21 9.6	15 17.0	55 59.55	1.489	5.1	21	U	3 35.2	2.17
	21.5	241 18 24.8	2 55 0.8	15 22.0	56 18.10	1.603	5.6	21	L	16 1.6	2.23
	22.0	247 43 28.5	2 26 22.8	15 27.5	56 37.99	1.711	6.1	22	U	4 28.7	2.29
	22.5	254 12 40.4	1 55 32.0	15 33.2	56 59.12	1.809	6.6	22	L	16 56.5	2.33
	23.0	260 46 24.2	-1 22 47.3	15 39.3	57 21.35	+1.894	7.1	23	U	5 24.6	2.36
	23.5	267 25 3.7	0 48 30.3	15 45.6	57 44.51	1.962	7.6	23	L	17 53.1	2.38
	24.0	274 9 1.1	-0 13 5.5	15 52.1	58 8.35	2.006	8.1	24	U	6 21.7	2.38
	24.5	280 58 35.7	+0 22 59.8	15 58.7	58 32.54	2.021	8.6	24	L	18 50.3	2.38
	25.0	287 54 2.4	0 59 14.9	16 5.2	58 56.70	1.999	9.1	25	U	7 18.7	2.36
	25.5	294 55 30.1	+1 35 6.5	16 11.7	59 20.35	+1.936	9.6	25	L	19 46.9	2.33
	26.0	302 3 0.1	2 9 58.6	16 17.9	59 42.97	1.826	10.1	26	U	8 14.7	2.30
	26.5	309 16 23.9	2 43 13.1	16 23.6	60 3.98	1.667	10.6	26	L	20 42.2	2.27
	27.0	316 35 22.3	3 14 10.8	16 28.7	60 22.78	1.458	11.1	27	U	9 9.3	2.25
	27.5	323 59 24.1	3 42 12.7	16 33.1	60 38.77	1.200	11.6	27	L	21 36.1	2.23
	28.0	331 27 45.9	+4 6 41.6	16 36.5	60 51.39	+0.896	12.1	28	U	10 2.8	2.21
	28.5	338 59 32.1	4 27 3.6	16 38.9	61 0.12	0.554	12.6	28	L	22 29.3	2.21
	29.0	346 33 36.6	4 42 50.0	16 40.1	61 4.56	+0.183	13.1	29	U	10 55.8	2.21
	29.5	354 8 45.0	4 53 39.1	16 40.1	61 4.46	-0.202	13.6	29	L	23 22.4	2.22
	30.0	1 43 37.7	4 59 17.0	16 38.8	60 59.72	0.588	14.1	30	U	11 49.2	2.24
	30.5	9 16 53.6	+4 59 39.1	16 36.3	60 50.40	-0.961	14.6			.....	...
Oct.	1.0	16 47 13.7	+4 54 49.6	16 32.5	60 36.75	-1.309	15.1	Oct. 1	L	0 16.2	2.27

## GREENWICH MEAN TIME.

G. M. T.		Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
		" ' "	" ' "	" "	" "	"	d				h m	m
Oct.	1.0	16 47 13.7	+4 54 49.6	16 32.5	60 36.75	-1.309	15.1	Oct.	1	L	0 16.2	2.27
	1.5	24 13 25.1	4 45 1.1	16 27.7	60 19.14	1.619	15.6		1	U	12 43.6	2.29
	2.0	31 34 23.9	4 30 33.9	16 22.0	59 58.09	1.881	16.1		2	L	1 11.3	2.32
	2.5	38 49 17.7	4 11 54.1	16 15.5	59 34.21	2.089	16.6		2	U	13 39.3	2.35
	3.0	45 57 26.9	3 49 32.0	16 8.4	59 8.16	2.243	17.1		3	L	2 7.6	2.37
	3.5	52 58 25.4	+3 24 0.3	16 0.9	58 40.63	-2.337	17.6		3	U	14 36.1	2.38
	4.0	59 52 0.2	2 55 52.9	15 53.2	58 12.30	2.376	18.1		4	L	3 4.6	2.37
	4.5	66 38 10.3	2 25 43.3	15 45.4	57 43.80	2.366	18.6		4	U	15 33.0	2.36
	5.0	73 17 5.4	1 54 3.7	15 37.7	57 15.70	2.311	19.1		5	L	4 1.1	2.33
	5.5	79 49 4.5	1 21 24.2	15 30.3	56 48.51	2.214	19.6		5	U	16 28.8	2.28
	6.0	86 14 33.7	+0 48 12.8	15 23.3	56 22.68	-2.086	20.1		6	L	4 55.9	2.23
	6.5	92 34 4.8	+0 14 54.9	15 16.7	55 58.54	1.932	20.6		6	U	17 22.2	2.17
	7.0	98 48 13.8	-0 18 6.5	15 10.7	55 36.38	1.758	21.1		7	L	5 47.8	2.10
	7.5	104 57 39.3	0 50 30.5	15 5.2	55 16.41	1.569	21.6		7	U	18 12.7	2.03
	8.0	111 3 1.2	1 21 58.2	15 0.4	54 58.78	1.370	22.1		8	L	6 36.7	1.97
	8.5	117 5 0.0	-1 52 12.6	14 56.3	54 43.56	-1.165	22.6		8	U	18 59.9	1.91
	9.0	123 4 15.9	2 20 58.0	14 52.8	54 30.81	0.960	23.1		9	L	7 22.4	1.85
	9.5	129 1 28.0	2 47 59.8	14 50.0	54 20.52	0.755	23.6		9	U	19 44.3	1.80
	10.0	134 57 13.3	3 13 4.4	14 47.9	54 12.66	0.556	24.1		10	L	8 5.7	1.76
	10.5	140 52 6.8	3 35 59.2	14 46.4	54 7.15	0.363	24.6		10	U	20 26.6	1.73
	11.0	146 46 41.2	-3 56 32.1	14 45.5	54 3.90	-0.180	25.1		11	L	8 47.2	1.70
	11.5	152 41 26.0	4 14 31.8	14 45.2	54 2.78	-0.008	25.6		11	U	21 7.5	1.69
	12.0	158 36 47.7	4 29 47.5	14 45.4	54 3.65	+0.152	26.1		12	L	9 27.8	1.68
	12.5	164 33 9.4	4 42 9.5	14 46.2	54 6.38	0.301	26.6		12	U	21 48.0	1.69
13.0	170 30 51.4	4 51 28.7	14 47.4	54 10.82	0.435	27.1		13	L	10 8.3	1.70	
13.5	176 30 10.0	-4 57 37.2	14 49.0	54 16.78	+0.556	27.6		13	U	22 28.9	1.72	
14.0	182 31 19.0	5 0 28.6	14 51.0	54 24.13	0.666	28.1		14	L	10 49.7	1.75	
14.5	188 34 29.2	4 59 57.9	14 53.3	54 32.71	0.762	28.6		14	U	23 11.0	1.79	
15.0	194 39 48.8	4 56 1.7	14 56.0	54 42.38	0.848	29.1		15	L	11 32.8	1.84	
15.5	200 47 23.7	4 48 38.9	14 58.9	54 53.02	0.922	29.6		15	U	23 55.3	1.90	
16.0	206 57 18.2	-4 37 50.4	15 2.0	55 4.48	+0.988	0.4						
16.5	213 9 36.0	4 23 39.5	15 5.3	55 16.71	1.047	0.9		16	L	12 18.4	1.96	
17.0	219 24 19.8	4 6 12.2	15 8.8	55 29.58	1.099	1.4		17	U	0 42.2	2.02	
17.5	225 41 32.1	3 45 37.0	15 12.5	55 43.05	1.147	1.9		17	L	13 6.9	2.08	
18.0	232 1 16.3	3 22 4.9	15 16.3	55 57.08	1.191	2.4		18	U	1 32.3	2.15	
18.5	238 23 36.7	-2 55 49.5	15 20.3	56 11.64	+1.234	2.9		18	L	13 58.4	2.21	
19.0	244 48 39.2	2 27 6.9	15 24.4	56 26.70	1.275	3.4		19	U	2 25.2	2.26	
19.5	251 16 31.2	1 56 15.8	15 28.6	56 42.24	1.314	3.9		19	L	14 52.5	2.30	
20.0	257 47 22.1	1 23 37.0	15 33.0	56 58.23	1.351	4.4		20	U	3 20.3	2.33	
20.5	264 21 22.6	0 49 33.6	15 37.5	57 14.66	1.387	4.9		20	L	15 48.4	2.34	
21.0	270 58 45.2	-0 14 30.7	15 42.0	57 31.49	+1.417	5.4		21	U	4 16.5	2.34	
21.5	277 39 43.2	+0 21 4.7	15 46.7	57 48.65	1.440	5.9		21	L	16 44.5	2.33	
22.0	284 24 29.8	0 56 43.9	15 51.5	58 6.01	1.452	6.4		22	U	5 12.4	2.31	
22.5	291 13 17.7	1 31 56.6	15 56.2	58 23.45	1.452	6.9		22	L	17 39.9	2.28	
23.0	298 6 17.9	2 6 11.2	16 0.9	58 40.78	1.433	7.4		23	U	6 7.0	2.25	
23.5	305 3 37.5	+2 38 55.2	16 5.6	58 57.74	+1.391	7.9		23	L	18 33.7	2.21	
24.0	312 5 19.6	+3 9 35.3	16 10.0	59 14.06	+1.324	8.4		24	U	7 0.1	2.18	

## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	" "	" "	" "	" "	" "	d		h m	m	
Oct. 24.0	312 5 19.6	+3 9 35.3	16 10.0	59 14.06	+1.324	8.4	Oct. 24	U	7 0.1	2.18
24.5	319 11 21.9	3 37 38.6	16 14.2	59 29.40	1.227	8.9	24	L	19 26.1	2.16
25.0	326 21 34.6	4 2 32.9	16 18.0	59 43.39	1.098	9.4	25	U	7 51.9	2.14
25.5	333 35 39.6	4 23 47.7	16 21.3	59 55.61	0.984	9.9	25	L	20 17.6	2.13
26.0	340 53 10.1	4 40 55.7	16 24.1	60 5.67	0.735	10.4	26	U	8 43.2	2.13
26.5	348 13 30.4	+4 53 33.4	16 26.1	60 13.14	+0.504	10.9	26	L	21 8.9	2.15
27.0	355 35 56.0	5 1 22.4	16 27.3	60 17.67	+0.248	11.4	27	U	9 34.7	2.17
27.5	2 59 34.4	5 4 11.1	16 27.7	60 18.99	-0.031	11.9	27	L	22 1.0	2.20
28.0	10 23 27.9	5 1 54.6	16 27.1	60 16.86	0.325	12.4	28	U	10 27.6	2.24
28.5	17 46 34.5	4 54 35.9	16 25.6	60 11.16	0.626	12.9	28	L	22 54.6	2.28
29.0	25 7 51.0	+4 42 25.3	16 23.0	60 1.87	-0.919	13.4	29	U	11 22.3	2.32
29.5	32 26 16.2	4 25 40.5	16 19.6	59 49.18	1.194	13.9	29	L	23 50.4	2.36
30.0	39 40 53.3	4 4 45.4	16 15.2	59 33.30	1.447	14.4	30	U	12 18.9	2.39
30.5	46 50 51.5	3 40 9.1	16 10.1	59 14.57	1.667	14.9			.....	...
31.0	53 55 28.8	3 12 24.2	16 4.4	58 53.44	1.847	15.4	31	L	0 47.7	2.41
31.5	60 54 12.9	+2 42 5.6	15 58.1	58 30.42	-1.983	15.9	31	U	13 16.8	2.42
Nov. 1.0	67 46 41.8	2 9 48.6	15 51.5	58 6.05	2.072	16.4	Nov. 1	L	1 45.7	2.41
1.5	74 32 43.5	1 36 8.0	15 44.6	57 40.89	2.116	16.9	1	U	14 14.5	2.38
2.0	81 12 16.1	1 1 37.3	15 37.7	57 15.46	2.114	17.4	2	L	2 42.8	2.33
2.5	87 45 26.4	+0 26 47.5	15 30.8	56 50.33	2.069	17.9	2	U	15 10.5	2.27
3.0	94 12 29.4	-0 7 52.9	15 24.2	56 25.95	-1.998	18.4	3	L	3 37.4	2.21
3.5	100 33 47.0	0 41 58.6	15 17.9	56 2.77	1.873	18.9	3	U	16 3.5	2.14
4.0	106 49 46.5	1 15 6.9	15 12.0	55 41.14	1.728	19.4	4	L	4 28.7	2.06
4.5	113 0 59.3	1 46 57.7	15 6.6	55 21.39	1.561	19.9	4	U	16 53.0	1.99
5.0	119 8 0.5	2 17 13.6	15 1.8	55 3.75	1.376	20.4	5	L	5 16.4	1.92
5.5	125 11 27.5	-2 45 39.1	14 57.6	54 48.44	-1.175	20.9	5	U	17 39.1	1.86
6.0	131 11 58.7	3 12 0.8	14 54.1	54 35.60	0.963	21.4	6	L	6 1.1	1.81
6.5	137 10 13.5	3 36 6.3	14 51.3	54 25.34	0.747	21.9	6	U	18 22.5	1.76
7.0	143 6 50.9	3 57 44.5	14 49.2	54 17.67	0.530	22.4	7	L	6 43.4	1.73
7.5	149 2 29.3	4 16 45.5	14 47.9	54 12.63	0.310	22.9	7	U	19 4.0	1.70
8.0	154 57 46.2	-4 33 0.0	14 47.2	54 10.20	-0.007	23.4	8	L	7 24.3	1.69
8.5	160 53 16.6	4 46 19.1	14 47.2	54 10.27	-0.107	23.9	8	U	19 44.5	1.68
9.0	166 49 34.2	4 56 35.0	14 47.9	54 12.75	0.304	24.4	9	L	8 4.7	1.69
9.5	172 47 9.7	5 3 40.3	14 49.2	54 17.52	0.468	24.9	9	U	20 25.1	1.71
10.0	178 46 30.8	5 7 28.5	14 51.1	54 24.41	0.659	25.4	10	L	8 45.8	1.73
10.5	184 48 2.1	-5 7 53.9	14 53.5	54 33.25	+0.813	25.9	10	U	21 6.7	1.77
11.0	190 52 4.7	5 4 52.2	14 56.4	54 43.84	0.947	26.4	11	L	9 28.1	1.81
11.5	196 58 56.4	4 58 20.4	14 59.6	54 55.91	1.062	26.9	11	U	21 50.2	1.87
12.0	203 8 50.9	4 48 17.5	15 3.3	55 9.26	1.159	27.4	12	L	10 13.0	1.93
12.5	209 21 58.4	4 34 44.7	15 7.2	55 23.64	1.233	27.9	12	U	22 36.6	2.00
13.0	215 38 25.6	-4 17 45.6	15 11.3	55 38.78	-1.296	28.4	13	L	11 0.9	2.07
13.5	221 58 15.8	3 57 26.6	15 15.6	55 54.44	1.321	28.9	13	U	23 26.1	2.14
14.0	228 21 29.3	3 33 57.4	15 20.0	56 10.41	1.336	29.4			.....	...
14.5	234 48 3.9	3 7 30.8	15 24.3	56 26.42	1.331	0.2	14	L	11 52.2	2.21
15.0	241 17 55.4	2 38 22.8	15 28.6	56 42.29	1.311	0.7	15	U	0 19.0	2.27
15.5	247 50 57.8	-2 6 53.1	15 32.9	56 57.84	+1.278	1.2	15	L	12 46.6	2.32
16.0	254 27 4.4	-1 33 24.3	15 37.0	57 12.92	+1.233	1.7	16	U	1 14.6	2.35



## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.			Var. per Hour.
	" "	" "	" "	" "	" "	d		h m	m	
Nov. 16.0	254 27 4.4	-1 33 24.3	15 37.0	57 12.92	+1.233	1.7	Nov. 16	U	1 14.6	2.35
16.5	261 6 7.9	0 58 21.8	15 40.9	57 27.41	1.151	2.2	16	L	13 43.0	2.37
17.0	267 48 1.3	-0 22 13.8	15 44.7	57 41.25	1.124	2.7	17	U	2 11.5	2.38
17.5	274 32 37.9	+0 14 29.6	15 48.3	57 54.35	1.080	3.2	17	L	14 40.0	2.37
18.0	281 19 51.9	0 51 16.9	15 51.6	58 6.68	0.996	3.7	18	U	3 8.2	2.34
18.5	288 9 38.0	+1 27 35.4	15 54.8	58 18.25	-0.932	4.2	18	L	15 36.1	2.30
19.0	295 1 51.8	2 2 52.1	15 57.7	58 29.05	0.867	4.7	19	U	4 3.4	2.26
19.5	301 56 29.3	2 36 34.2	16 0.5	58 39.06	0.802	5.2	19	L	16 30.3	2.22
20.0	308 53 26.5	3 8 9.5	16 3.0	58 48.29	0.736	5.7	20	U	4 56.6	2.17
20.5	315 52 38.9	3 37 7.1	16 5.3	58 56.70	0.666	6.2	20	L	17 22.4	2.13
21.0	322 54 0.7	+4 2 57.9	16 7.3	59 4.25	+0.591	6.7	21	U	5 47.8	2.10
21.5	329 57 24.3	4 25 15.5	16 9.1	59 10.87	0.509	7.2	21	L	18 12.8	2.08
22.0	337 2 39.5	4 43 36.1	16 10.6	59 16.44	0.419	7.7	22	U	6 37.7	2.07
22.5	344 9 32.7	4 57 39.3	16 11.8	59 20.87	0.317	8.2	22	L	19 2.5	2.07
23.0	351 17 46.8	5 7 9.4	16 12.7	59 23.99	0.200	8.7	23	U	7 27.4	2.08
23.5	358 27 0.5	+5 11 54.7	16 13.2	59 25.62	+0.069	9.2	23	L	19 52.4	2.10
24.0	5 36 48.6	5 11 48.9	16 13.1	59 25.60	-0.076	9.7	24	U	8 17.8	2.13
24.5	12 46 41.7	5 6 51.3	16 12.6	59 23.75	0.235	10.2	24	L	20 43.7	2.17
25.0	19 56 7.5	4 57 6.9	16 11.6	59 19.90	0.406	10.7	25	U	9 10.0	2.22
25.5	27 4 31.0	4 42 46.5	16 10.0	59 13.98	0.583	11.2	25	L	21 36.9	2.27
26.0	34 11 15.6	+4 24 6.6	16 7.8	59 5.89	-0.765	11.7	26	U	10 4.4	2.31
26.5	41 15 44.5	4 1 28.6	16 5.0	58 55.61	0.946	12.2	26	L	22 32.4	2.36
27.0	48 17 22.2	3 35 18.7	16 1.6	58 43.20	1.121	12.7	27	U	11 0.9	2.39
27.5	55 15 35.1	3 6 6.7	15 57.7	58 28.76	1.281	13.2	27	L	23 29.7	2.40
28.0	62 9 53.7	2 34 24.9	15 53.2	58 12.53	1.423	13.7	28	U	11 58.5	2.40
28.5	68 59 52.5	+2 0 47.2	15 48.3	57 54.71	-1.543	14.2			.....	...
29.0	75 45 11.7	1 25 48.0	15 43.2	57 35.62	1.634	14.7	29	L	0 27.3	2.39
29.5	82 25 37.3	0 50 1.0	15 37.7	57 15.62	1.696	15.2	29	U	12 55.7	2.35
30.0	89 1 1.3	+0 13 58.5	15 32.1	56 55.05	1.725	15.7	30	L	1 23.7	2.30
30.5	95 31 21.8	-0 21 49.2	15 26.5	56 34.34	1.721	16.2	30	U	13 50.9	2.24
Dec. 1.0	101 56 43.5	-0 56 54.4	15 20.9	56 13.87	-1.685	16.7	Dec. 1	L	2 17.3	2.17
1.5	108 17 16.0	1 30 51.9	15 15.5	55 54.02	1.617	17.2	1	U	14 42.8	2.09
2.0	114 33 14.6	2 3 19.9	15 10.4	55 35.18	1.519	17.7	2	L	3 7.4	2.01
2.5	120 44 59.3	2 33 59.2	15 5.6	55 17.67	1.396	18.2	2	U	15 31.2	1.94
3.0	126 52 53.9	3 2 33.2	15 1.2	55 1.78	1.248	18.7	3	L	3 54.1	1.88
3.5	132 57 26.1	-3 28 47.6	14 57.4	54 47.80	-1.079	19.2	3	U	16 16.3	1.82
4.0	138 59 6.3	3 52 30.4	14 54.2	54 35.95	0.893	19.7	4	L	4 37.8	1.77
4.5	144 58 27.1	4 13 31.1	14 51.6	54 26.42	0.693	20.2	4	U	16 58.8	1.73
5.0	150 56 3.0	4 31 40.9	14 49.7	54 19.36	0.482	20.7	5	L	5 19.5	1.70
5.5	156 52 29.6	4 46 52.1	14 48.5	54 14.88	0.264	21.2	5	U	17 39.8	1.69
6.0	162 48 23.5	-4 58 58.0	14 48.0	54 13.05	-0.042	21.7	6	L	6 0.0	1.68
6.5	168 41 21.3	5 7 52.4	14 48.2	54 13.88	+0.180	22.2	6	U	18 20.2	1.68
7.0	174 40 59.3	5 13 30.3	14 49.2	54 17.38	0.401	22.7	7	L	6 40.4	1.70
7.5	180 38 52.9	5 15 46.8	14 50.8	54 23.48	0.614	23.2	7	U	19 1.0	1.72
8.0	186 38 36.5	5 14 38.2	14 53.2	54 32.09	0.819	23.7	8	L	7 21.9	1.76
8.5	192 40 42.8	-5 10 1.2	14 56.2	54 43.09	+1.012	24.2	8	U	19 43.3	1.80
9.0	198 45 41.9	-5 1 53.8	11 59.8	54 56.31	+1.198	24.7	9	L	8 5.3	1.86

## GREENWICH MEAN TIME.

G. M. T.	Longitude.	Latitude.	Semi-diameter.	Horizontal Parallax.	Var. per Hour.	Age.	Transit, Meridian of Greenwich.				Var. per Hour.
	" " "	" " "	" "	" "	" "	d			h m	m	
Dec. 9.0	198 45 41.9	-5 1 53.8	14 59.8	54 56.31	+1.188	24.7	Dec. 9	L	8 5.3	1.86	
9.5	204 54 1.3	4 50 15.4	15 3.9	55 11.53	1.344	25.2	9	U	20 28.0	1.93	
10.0	211 6 5.2	4 35 6.9	15 8.5	55 28.48	1.477	25.7	10	L	8 51.6	2.00	
10.5	217 22 14.2	4 16 31.5	15 13.5	55 46.87	1.585	26.2	10	U	21 16.0	2.08	
11.0	223 42 44.7	3 54 34.8	15 18.9	56 6.40	1.664	26.7	11	L	9 41.4	2.16	
11.5	230 7 48.2	-3 29 25.5	15 24.4	56 26.69	+1.710	27.2	11	U	22 7.8	2.23	
12.0	236 37 31.8	3 1 15.7	15 30.0	56 47.33	1.725	27.7	12	L	10 35.0	2.30	
12.5	243 11 57.2	2 30 21.3	15 35.6	57 7.98	1.709	28.2	12	U	23 3.0	2.36	
13.0	249 51 1.2	1 57 2.2	15 41.2	57 28.22	1.658	28.7			.....	...	
13.5	256 34 35.5	1 21 42.5	15 46.5	57 47.66	1.577	29.2	13	L	11 31.6	2.41	
14.0	263 22 26.9	-0 44 50.0	15 51.4	58 5.95	+1.466	0.1	14	U	0 0.7	2.43	
14.5	270 14 17.9	-0 6 56.1	15 56.0	58 22.75	1.330	0.6	14	L	12 29.9	2.44	
15.0	277 9 47.3	+0 31 24.6	16 0.1	58 37.79	1.175	1.1	15	U	0 59.1	2.42	
15.5	284 8 30.7	1 9 35.4	16 3.7	58 50.89	1.006	1.6	15	L	13 28.0	2.40	
16.0	291 10 1.2	1 46 58.5	16 6.7	59 1.88	0.824	2.1	16	U	1 56.5	2.35	
16.5	298 13 50.8	+2 22 55.8	16 9.1	59 10.67	+0.641	2.6	16	L	14 24.5	2.30	
17.0	305 19 30.5	2 56 50.2	16 10.9	59 17.30	0.463	3.1	17	U	2 51.8	2.25	
17.5	312 26 31.2	3 28 6.5	16 12.1	59 21.80	0.289	3.6	17	L	15 18.5	2.20	
18.0	319 34 24.9	3 56 12.6	16 12.8	59 24.29	+0.128	4.1	18	U	3 44.6	2.15	
18.5	326 42 44.9	4 20 40.1	16 13.0	59 24.91	-0.021	4.6	18	L	16 10.2	2.11	
19.0	333 51 6.0	+4 41 4.9	16 12.7	59 23.83	-0.155	5.1	19	U	4 35.4	2.08	
19.5	340 59 5.3	4 57 7.8	16 12.0	59 21.23	0.276	5.6	19	L	17 0.3	2.06	
20.0	348 6 21.7	5 8 34.7	16 10.9	59 17.26	0.382	6.1	20	U	5 25.0	2.06	
20.5	355 12 36.6	5 15 16.7	16 9.5	59 12.11	0.475	6.6	20	L	17 49.7	2.06	
21.0	2 17 32.9	5 17 9.9	16 7.8	59 5.92	0.556	7.1	21	U	6 14.5	2.08	
21.5	9 20 55.4	+5 14 15.4	16 5.8	58 58.79	-0.632	7.6	21	L	18 39.6	2.10	
22.0	16 22 30.3	5 6 39.3	16 3.7	58 50.78	0.702	8.1	22	U	7 5.0	2.13	
22.5	23 22 5.1	4 54 32.1	16 1.3	58 41.97	0.767	8.6	22	L	19 30.9	2.17	
23.0	30 19 27.8	4 38 8.5	15 58.6	58 32.36	0.832	9.1	23	U	7 57.2	2.22	
23.5	37 14 27.3	4 17 46.9	15 55.8	58 22.00	0.896	9.6	23	L	20 24.1	2.26	
24.0	44 6 53.1	+3 53 49.3	15 52.8	58 10.85	-0.961	10.1	24	U	8 51.4	2.30	
24.5	50 56 34.7	3 26 40.6	15 49.5	57 58.94	1.025	10.6	24	L	21 19.2	2.33	
25.0	57 43 22.6	2 56 48.1	15 46.1	57 46.25	1.090	11.1	25	U	9 47.3	2.35	
25.5	64 27 7.1	2 24 40.9	15 42.4	57 32.80	1.150	11.6	25	L	22 15.5	2.35	
26.0	71 7 39.8	1 50 49.4	15 38.6	57 18.67	1.206	12.1	26	U	10 43.7	2.34	
26.5	77 44 52.8	+1 15 44.6	15 34.5	57 3.89	-1.256	12.6	26	L	23 11.7	2.31	
27.0	84 18 39.7	0 39 57.4	15 30.4	56 48.58	1.295	13.1	27	U	11 39.2	2.26	
27.5	90 48 55.6	+0 3 58.0	15 26.1	56 32.86	1.323	13.6			.....	...	
28.0	97 15 37.1	-0 31 44.5	15 21.7	56 16.90	1.334	14.1	28	L	0 6.2	2.22	
28.5	103 38 43.6	1 6 42.7	15 17.4	56 0.91	1.327	14.6	28	U	12 32.4	2.15	
29.0	109 58 16.5	-1 40 31.4	15 13.1	55 45.13	-1.302	15.1	29	L	0 57.9	2.09	
29.5	116 14 20.2	2 12 47.6	15 8.9	55 29.73	1.259	15.6	29	U	13 22.5	2.02	
30.0	122 27 1.8	2 43 11.0	15 4.8	55 15.00	1.194	16.1	30	L	1 46.3	1.95	
30.5	128 36 31.4	3 11 23.5	15 1.1	55 1.17	1.108	16.6	30	U	14 9.3	1.89	
31.0	134 43 2.1	3 37 9.8	14 57.6	54 48.50	1.000	17.1	31	L	2 31.5	1.83	
31.5	140 46 50.4	-4 0 17.1	14 54.6	54 37.25	-0.873	17.6	31	U	14 53.2	1.78	
32.0	146 48 15.4	-4 20 34.5	14 51.9	54 27.63	-0.726	18.1	32	L	3 14.3	1.74	

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	h	m	s								

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Feb.	16	20 15	24.11	+12.459	-20 2	13.6		+ 16.67	0.019 3706	+2580.1	3.20	8.42	22 32.8
	17	20 20	26.77	12.758	19 54	56.1		19.79	0.025 4536	2489.5	3.15	8.30	22 34.0
	18	20 25	36.31	13.033	19 46	23.3		22.94	0.031 3224	2401.6	3.11	8.19	22 35.3
	19	20 30	52.15	13.283	19 36	34.7		26.11	0.036 9832	2316.2	3.06	8.08	22 36.8
	20	20 36	13.74	13.513	19 25	30.0		29.29	0.042 4425	2233.6	3.03	7.98	22 38.3
	21	20 41	40.62	+13.724	-19 13	8.8		+ 32.48	0.047 7065	+2153.6	2.99	7.88	22 39.8
	22	20 47	12.35	13.918	18 59	30.9		35.69	0.052 7817	2076.1	2.96	7.79	22 41.5
	23	20 52	48.57	14.097	18 44	35.9		38.90	0.057 6736	2001.0	2.92	7.71	22 43.2
	24	20 58	28.90	14.262	18 28	23.9		42.11	0.062 3883	1928.2	2.89	7.62	22 45.0
	25	21 4	13.06	14.415	18 10	54.7		45.32	0.066 9309	1857.7	2.86	7.54	22 46.9
Mar.	26	21 10	0.75	+14.557	-17 52	8.3		+ 48.55	0.071 3068	+1789.2	2.84	7.47	22 48.8
	27	21 15	51.74	14.690	17 32	4.4		51.77	0.075 5206	1722.5	2.81	7.39	22 50.7
	28	21 21	45.81	14.815	17 10	43.3		54.99	0.079 5762	1657.5	2.78	7.33	22 52.7
	1	21 27	42.78	14.932	16 48	4.9		58.21	0.083 4781	1594.2	2.76	7.26	22 54.8
	2	21 33	42.49	15.043	16 24	9.3		61.43	0.087 2294	1532.1	2.74	7.20	22 56.9
	3	21 39	44.80	+15.149	-15 58	56.4		+ 64.64	0.090 8333	+1471.2	2.72	7.14	22 59.0
	4	21 45	49.59	15.250	15 32	26.5		67.85	0.094 2922	1411.4	2.69	7.08	23 1.2
	5	21 51	56.77	15.348	15 4	39.6		71.05	0.097 6085	1352.2	2.67	7.03	23 3.4
	6	21 58	6.26	15.443	14 35	36.0		74.25	0.100 7831	1293.4	2.65	6.98	23 5.7
	7	22 4	18.01	15.536	14 5	15.7		77.44	0.103 8174	1235.2	2.63	6.93	23 8.0
	8	22 10	31.98	+15.628	-13 33	38.9		+ 80.62	0.106 7123	+1177.1	2.61	6.88	23 10.3
	9	22 16	48.16	15.720	13 0	46.0		83.79	0.109 4673	1118.7	2.60	6.84	23 12.7
	10	22 23	6.52	15.811	12 26	37.1		86.95	0.112 0817	1059.9	2.58	6.80	23 15.1
	11	22 29	27.11	15.904	11 51	12.5		90.10	0.114 5543	1000.5	2.56	6.76	23 17.5
	12	22 35	49.94	15.998	11 14	32.5		93.23	0.116 8833	940.1	2.55	6.72	23 20.0
	13	22 42	15.04	+16.094	-10 36	37.7		+ 96.34	0.119 0658	+ 878.4	2.54	6.69	23 22.5
	14	22 48	42.48	16.193	9 57	28.3		99.44	0.121 0981	815.0	2.52	6.66	23 25.1
	15	22 55	12.33	16.295	9 17	5.0		102.50	0.122 9763	749.7	2.51	6.63	23 27.7
	16	23 1	44.65	16.400	8 35	28.4		105.55	0.124 6949	682.0	2.50	6.60	23 30.3
	17	23 8	19.54	16.509	7 52	39.0		108.56	0.126 2479	611.6	2.49	6.58	23 33.0
	18	23 14	57.09	+16.621	- 7 8	38.0		+111.52	0.127 6280	+ 537.9	2.49	6.56	23 35.7
	19	23 21	37.41	16.739	6 23	26.2		114.45	0.128 8270	460.6	2.49	6.55	23 38.5
	20	23 28	20.60	16.861	5 37	4.8		117.32	0.129 8357	379.0	2.48	6.53	23 41.3
	21	23 35	6.76	16.986	4 49	35.3		120.15	0.130 6432	293.0	2.47	6.51	23 44.2
	22	23 41	55.99	17.117	4 0	59.3		122.86	0.131 2380	201.7	2.47	6.50	23 47.2
	23	23 48	48.41	+17.252	- 3 11	18.9		+125.50	0.131 6067	+ 104.5	2.47	6.50	23 50.2
	24	23 55	44.10	17.389	2 20	36.3		128.03	0.131 7347	+ 1.0	2.47	6.50	23 53.2
	25	0 2	43.12	17.530	1 28	54.3		130.44	0.131 6060	- 109.5	2.47	6.50	23 56.3
	26	0 9	45.54	17.672	0 36	16.2		132.71	0.131 2031	227.6	2.47	6.50	23 59.5
	27	0 16	51.37	17.814	+ 0 17	14.2		134.80	0.130 5072	353.7	2.47	6.51	...
	28	0 24	0.61	+17.955	+ 1 11	32.6		+136.69	0.129 4981	- 488.7	2.48	6.53	0 2.7
	29	0 31	13.19	18.092	2 6	33.6		138.35	0.128 1539	632.9	2.49	6.55	0 6.0
	30	0 38	28.99	18.223	3 2	11.4		139.75	0.126 4526	786.6	2.49	6.58	0 9.3
	31	0 45	47.83	18.345	3 58	19.2		140.84	0.124 3705	950.1	2.50	6.61	0 12.7
Apr.	1	0 53	9.44	18.454	4 54	49.1		141.59	0.121 8842	1123.5	2.52	6.65	0 16.1
	2	1 0	33.46	+18.545	+ 5 51	32.5		+141.96	0.118 9700	-1306.6	2.54	6.69	0 19.6
	3	1 7	59.43	+18.615	+ 6 48	19.6		+141.90	0.115 6050	-1499.0	2.56	6.74	0 23

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	h	m	s		°	'	"						
Apr.	1	0 53	9.44	+18.454	+ 4 54	49.1	+141.59	0.121 8842	-1123.5	2.52	6.65	0 16.1	
	2	1 0	33.46	18.545	5 51	32.5	141.96	0.118 9700	1306.6	2.54	6.69	0 19.6	
	3	1 7	59.43	18.615	6 48	19.6	141.90	0.115 6050	1499.0	2.56	6.74	0 23.1	
	4	1 15	26.78	18.659	7 44	59.8	141.37	0.111 7679	1700.0	2.58	6.80	0 26.6	
	5	1 22	54.82	18.672	8 41	21.5	140.35	0.107 4392	1906.4	2.61	6.87	0 30.1	
	6	1 30	22.76	+18.680	+ 9 37	12.4	+138.80	0.102 6027	-2122.9	2.64	6.95	0 33.7	
	7	1 37	49.68	18.586	10 32	19.7	136.71	0.097 2457	2341.9	2.67	7.03	0 37.2	
	8	1 45	14.55	18.479	11 26	30.2	134.07	0.091 3598	2563.3	2.71	7.13	0 40.7	
	9	1 52	36.28	18.324	12 19	30.5	130.87	0.084 9417	2785.0	2.75	7.24	0 44.1	
	10	1 59	53.67	18.117	13 11	7.6	127.14	0.077 9935	3004.6	2.79	7.35	0 47.4	
	11	2 7	5.48	+17.858	+14 1	8.9	+122.89	0.070 5228	-3220.1	2.84	7.48	0 50.7	
	12	2 14	10.45	17.547	14 49	22.7	118.18	0.062 5424	3429.0	2.89	7.62	0 53.8	
	13	2 21	7.30	17.182	15 35	38.2	113.05	0.054 0706	3629.3	2.95	7.77	0 56.8	
	14	2 27	54.78	16.766	16 19	46.0	107.54	0.045 1301	3819.1	3.01	7.93	0 59.7	
	15	2 34	31.66	16.299	17 1	37.7	101.72	0.035 7480	3997.2	3.07	8.10	1 2.4	
	16	2 40	56.76	+15.785	+17 41	6.6	+ 95.65	0.025 9540	-4162.1	3.15	8.29	1 4.8	
	17	2 47	8.97	15.225	18 18	7.3	89.38	0.015 7815	4312.7	3.23	8.49	1 7.1	
	18	2 53	7.24	14.624	18 52	35.5	82.95	0.005 2649	4448.6	3.30	8.69	1 9.1	
	19	2 58	50.60	13.983	19 24	28.3	76.43	9.994 4403	4569.3	3.38	8.91	1 10.9	
	20	3 4	18.11	13.304	19 53	43.8	69.85	9.983 3448	4674.3	3.47	9.14	1 12.4	
	21	3 9	28.92	+12.592	+20 20	21.0	+ 63.24	9.972 0163	-4763.5	3.57	9.39	1 13.6	
	22	3 14	22.26	11.848	20 44	19.5	56.63	9.960 4928	4836.8	3.66	9.64	1 14.5	
	23	3 18	57.38	11.074	21 5	39.5	50.04	9.948 8128	4893.8	3.76	9.90	1 15.1	
	24	3 23	13.60	10.274	21 24	21.7	43.48	9.937 0159	4934.3	3.86	10.17	1 15.5	
	25	3 27	10.31	9.448	21 40	27.0	36.97	9.925 1414	4958.2	3.97	10.46	1 15.4	
	26	3 30	46.94	+ 8.601	+21 53	56.6	+ 30.51	9.913 2301	-4965.0	4.08	10.75	1 15.1	
	27	3 34	2.98	7.733	22 4	51.9	24.11	9.901 3236	4984.1	4.19	11.04	1 14.4	
	28	3 36	57.99	6.849	22 13	14.3	17.76	9.889 4651	4925.0	4.31	11.35	1 13.4	
	29	3 39	31.61	5.951	22 19	5.1	11.49	9.877 6990	4876.8	4.42	11.66	1 12.0	
	30	3 41	43.55	5.043	22 22	26.1	+ 5.27	9.866 0723	4808.8	4.54	11.98	1 10.2	
May	1	3 43	33.64	+ 4.131	+22 23	18.7	- 0.89	9.854 6334	-4720.0	4.67	12.30	1 8.1	
	2	3 45	1.82	3.218	22 21	44.8	6.93	9.843 4337	4609.5	4.79	12.62	1 5.6	
	3	3 46	8.14	2.311	22 17	46.7	12.90	9.832 5260	4476.4	4.91	12.94	1 2.7	
	4	3 46	52.83	1.416	22 11	26.7	18.75	9.821 9659	4319.7	5.03	13.26	0 59.5	
	5	3 47	16.28	+ 0.542	22 2	48.1	24.45	9.811 8108	4138.9	5.15	13.57	0 56.0	
	6	3 47	19.10	- 0.302	+21 51	54.5	- 29.98	9.802 1191	-3933.3	5.27	13.88	0 52.1	
	7	3 47	2.08	1.110	21 38	50.8	35.29	9.792 9509	3702.8	5.38	14.17	0 47.9	
	8	3 46	26.22	1.870	21 23	42.9	40.32	9.784 3653	3447.6	5.49	14.46	0 43.3	
	9	3 45	32.77	2.574	21 6	37.9	45.03	9.776 4216	3168.2	5.59	14.72	0 38.5	
	10	3 44	23.19	3.212	20 47	44.6	49.35	9.769 1760	2866.1	5.68	14.97	0 33.4	
	11	3 42	59.19	- 3.775	+20 27	12.9	- 53.20	9.762 6814	-2542.7	5.77	15.20	0 28.1	
	12	3 41	22.64	4.256	20 5	15.0	56.53	9.756 9863	2200.2	5.84	15.40	0 22.5	
	13	3 39	35.62	4.647	19 42	4.0	59.27	9.752 1333	1841.7	5.90	15.57	0 16.8	
	14	3 37	40.33	4.944	19 17	55.1	61.36	9.748 1561	1470.6	5.96	15.72	0 11.0	
	15	3 35	39.08	5.143	18 53	4.5	62.74	9.745 0818	1090.3	6.00	15.83	0 5.1	
	16	3 33	34.26	- 5.242	+18 27	49.3	- 63.39	9.742 9268	- 705.0	6.03	15.91	23 53.0	
	17	3 31	28.25	- 5.242	+18 2	27.7	- 63.28	9.741 6986	- 318.8	6.05	15.95	23 47.0	

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"		"	"	"	h m
May	17	3 31	28.25	- 5.242	+18 2	27.7	-63.28	9.741 6986	- 318.8	6.05	15.95	23 47.0	
	18	3 29	23.38	5.148	17 37	17.8	62.41	9.741 3937	+ 63.9	6.05	15.96	23 41.1	
	19	3 27	21.90	4.960	17 12	37.9	60.80	9.741 9996	439.4	6.04	15.94	23 35.3	
	20	3 25	25.98	4.687	16 48	45.3	58.46	9.743 4938	803.8	6.02	15.88	23 29.5	
	21	3 23	37.56	4.355	16 25	56.9	55.47	9.745 8462	1153.8	5.99	15.80	23 23.9	
	22	3 21	58.45	- 3.913	+16 4	27.7	-51.87	9.749 0184	+1486.7	5.95	15.68	23 18.5	
	23	3 20	30.23	3.429	15 44	31.5	47.73	9.752 9668	1800.2	5.90	15.54	23 13.4	
	24	3 19	14.28	2.892	15 26	20.1	43.15	9.757 6426	2092.7	5.83	15.38	23 8.4	
	25	3 18	11.76	2.311	15 10	3.4	38.19	9.762 9943	2363.2	5.76	15.19	23 3.6	
	26	3 17	23.64	1.694	14 55	49.5	32.93	9.768 9679	2611.0	5.68	14.98	22 59.1	
	27	3 16	50.67	- 1.049	+14 43	44.3	-27.47	9.775 5087	+2836.0	5.60	14.76	22 54.9	
	28	3 16	33.44	- 0.384	14 33	52.0	21.87	9.782 5625	3038.3	5.50	14.52	22 51.0	
	29	3 16	32.35	+ 0.296	14 26	15.0	16.21	9.790 0763	3219.4	5.41	14.27	22 47.3	
	30	3 16	47.70	0.984	14 20	54.2	10.53	9.797 9992	3379.6	5.31	14.01	22 43.9	
	31	3 17	19.63	1.677	14 17	49.1	- 4.91	9.806 2825	3519.9	5.22	13.75	22 40.7	
June	1	3 18	8.21	+ 2.371	+14 16	57.9	+ 0.62	9.814 8801	+5641.9	5.11	13.48	22 37.8	
	2	3 19	13.40	3.062	14 18	17.9	6.02	9.823 7498	3746.7	5.01	13.20	22 35.3	
	3	3 20	35.14	3.749	14 21	45.4	11.24	9.832 8515	3835.5	4.90	12.93	22 32.9	
	4	3 22	13.28	4.429	14 27	16.1	16.28	9.842 1487	3909.9	4.80	12.66	22 30.9	
	5	3 24	7.65	5.101	14 34	45.1	21.10	9.851 6080	3970.7	4.70	12.38	22 29.1	
	6	3 26	18.09	+ 5.767	+14 44	6.9	+25.68	9.861 1983	+4019.4	4.59	12.11	22 27.6	
	7	3 28	44.42	6.425	14 55	15.9	30.02	9.870 8920	4056.9	4.50	11.85	22 26.3	
	8	3 31	26.44	7.075	15 8	6.0	34.11	9.880 6629	4084.0	4.39	11.58	22 25.3	
	9	3 34	23.97	7.718	15 22	30.9	37.98	9.890 4875	4101.7	4.30	11.32	22 24.6	
	10	3 37	36.86	8.356	15 38	24.2	41.47	9.900 3444	4111.0	4.20	11.07	22 24.1	
	11	3 41	4.98	+ 8.987	+15 55	39.3	+44.74	9.910 2139	+4112.1	4.10	10.82	22 23.9	
	12	3 44	48.18	9.613	16 14	9.5	47.73	9.920 0765	4105.7	4.01	10.58	22 23.9	
	13	3 48	46.40	10.238	16 33	47.9	50.42	9.929 9156	4092.3	3.93	10.34	22 24.1	
	14	3 52	59.57	10.859	16 54	27.5	52.83	9.939 7143	4072.2	3.85	10.11	22 24.6	
	15	3 57	27.64	11.481	17 16	1.4	54.94	9.949 4571	4045.6	3.76	9.89	22 25.4	
	16	4 2	10.64	+12.102	+17 38	22.2	+56.74	9.959 1281	+4012.5	3.67	9.67	22 26.4	
	17	4 7	8.56	12.725	18 1	22.4	58.22	9.968 7121	3973.1	3.59	9.46	22 27.7	
	18	4 12	21.46	13.350	18 24	54.4	59.39	9.978 1936	3927.1	3.51	9.25	22 29.2	
	19	4 17	49.40	13.979	18 48	50.2	60.21	9.987 5568	3874.4	3.44	9.06	22 30.9	
	20	4 23	32.46	14.611	19 13	1.7	60.69	9.996 7852	3814.7	3.37	8.87	22 32.9	
	21	4 29	30.73	+15.245	+19 37	20.1	+60.79	0.005 8618	+3747.9	3.29	8.68	22 35.2	
	22	4 35	44.26	15.883	20 1	36.5	60.51	0.014 7688	3673.3	3.23	8.51	22 37.7	
	23	4 42	13.14	16.524	20 25	41.5	59.83	0.023 4870	3590.5	3.17	8.34	22 40.5	
	24	4 48	57.39	17.164	20 49	25.1	58.73	0.031 9963	3499.1	3.10	8.17	22 43.6	
	25	4 55	57.00	17.803	21 12	37.0	57.19	0.040 2752	3398.4	3.04	8.02	22 46.9	
	26	5 3	11.88	+18.436	+21 35	6.4	+55.18	0.048 3009	+3288.1	2.98	7.87	22 50.4	
	27	5 10	41.87	19.061	21 56	41.8	52.69	0.056 0501	3167.8	2.93	7.73	22 54.2	
	28	5 18	26.71	19.672	22 17	11.8	49.72	0.063 4981	3037.1	2.88	7.60	22 58.3	
	29	5 26	25.99	20.264	22 36	24.3	46.24	0.070 6195	2895.7	2.84	7.48	23 2.5	
	30	5 34	39.19	20.831	22 54	7.1	42.25	0.077 3889	2743.7	2.79	7.36	23 7.1	
July	1	5 43	5.60	+21.364	+23 10	8.2	+37.76	0.083 7811	+2581.4	2.76	7.26	23 11.8	
	2	5 51	44.35	+21.857	+23 24	15.9	+32.80	0.089 7719	+2409.3	2.72	7.16	23 16.7	

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
July	1	5 43	5.60	+21.364	+23 10	8.2		+ 37.76	0.083 7811	+2581.4	2.76	7.26	23 11.8
	2	5 51	44.35	21.857	23 24	15.9		32.80	0.089 7719	2409.3	2.72	7.16	23 16.7
	3	6 0	34.37	22.303	23 36	18.8		27.37	0.095 3386	2228.1	2.68	7.07	23 21.7
	4	6 9	34.45	22.694	23 46	6.4		21.53	0.100 4606	2039.0	2.65	6.99	23 27.0
	5	6 18	43.18	23.023	23 53	29.3		15.32	0.105 1207	1843.4	2.62	6.91	23 32.3
	6	6 27	59.02	+23.285	+23 58	19.6		+ 8.82	0.109 3053	+1643.1	2.60	6.84	23 37.7
	7	6 37	20.31	23.477	24 0	30.7		+ 2.07	0.113 0050	1459.6	2.57	6.78	23 43.2
	8	6 46	45.33	23.596	23 59	58.0		- 4.81	0.116 2146	1235.2	2.55	6.73	23 48.8
	9	6 56	12.31	23.641	23 56	39.1		11.77	0.118 9349	1032.0	2.53	6.69	23 54.3
	10	7 5	39.51	23.614	23 50	33.0		18.72	0.121 1702	831.4	2.52	6.66	23 59.8
	11	7 15	5.24	+23.519	+23 41	41.1		- 25.58	0.122 9292	+ 635.6	2.51	6.63	...
	12	7 24	27.89	23.359	23 30	6.3		32.29	0.124 2259	446.1	2.50	6.61	0 5.2
	13	7 33	46.03	23.143	23 15	53.1		38.77	0.125 0761	263.8	2.50	6.60	0 10.6
	14	7 42	58.33	22.875	22 59	7.4		44.99	0.125 4989	+ 90.1	2.49	6.59	0 15.9
	15	7 52	3.66	22.563	22 39	56.2		50.89	0.125 5156	- 74.7	2.50	6.60	0 21.1
	16	8 1	1.04	+22.213	+22 18	27.2		- 56.46	0.125 1479	- 230.0	2.50	6.60	0 26.1
	17	8 9	49.68	21.835	21 54	48.9		61.67	0.124 4192	375.7	2.50	6.61	0 31.0
	18	8 18	28.93	21.433	21 29	9.8		66.52	0.123 3518	512.1	2.51	6.62	0 35.7
	19	8 26	58.32	21.014	21 1	38.8		71.00	0.121 9682	639.4	2.52	6.64	0 40.3
	20	8 35	17.49	20.582	20 32	24.9		75.11	0.120 2897	757.9	2.53	6.67	0 44.6
	21	8 43	26.22	+20.144	+20 1	36.5		- 78.86	0.118 3368	- 868.2	2.54	6.70	0 48.9
	22	8 51	24.37	19.702	19 29	22.2		82.27	0.116 1286	970.8	2.55	6.73	0 52.9
	23	8 59	11.91	19.260	18 55	50.1		85.35	0.113 6826	1066.4	2.56	6.77	0 56.7
	24	9 6	48.87	18.821	18 21	8.0		88.11	0.111 0152	1155.6	2.58	6.81	1 0.4
	25	9 14	15.33	18.385	17 45	23.2		90.57	0.108 1406	1238.8	2.60	6.86	1 3.9
	26	9 21	31.41	+17.957	+17 8	42.8		- 92.75	0.105 0730	-1316.8	2.62	6.91	1 7.2
	27	9 28	37.31	17.536	16 31	13.3		94.67	0.101 8235	1390.3	2.64	6.97	1 10.4
	28	9 35	33.20	17.123	15 53	0.8		96.33	0.098 4028	1459.6	2.66	7.02	1 13.4
	29	9 42	19.28	16.719	15 14	11.4		97.75	0.094 8201	1525.4	2.68	7.07	1 16.2
	30	9 48	55.78	16.324	14 34	50.4		98.96	0.091 0836	1588.0	2.71	7.13	1 18.9
	31	9 55	22.91	+15.939	+13 55	3.1		- 99.95	0.087 2001	-1647.9	2.74	7.20	1 21.4
Aug.	1	10 1	40.90	15.562	13 14	54.2		100.75	0.083 1757	1705.5	2.76	7.27	1 23.7
	2	10 7	49.94	15.194	12 34	28.4		101.37	0.079 0151	1761.4	2.78	7.33	1 25.9
	3	10 13	50.27	14.835	11 53	50.0		101.81	0.074 7223	1815.7	2.81	7.41	1 28.0
	4	10 19	42.06	14.482	11 13	3.0		102.08	0.070 3009	1868.7	2.84	7.48	1 29.9
	5	10 25	25.49	+14.138	+10 32	11.5		-102.19	0.065 7530	-1920.9	2.87	7.56	1 31.7
	6	10 31	0.73	13.800	9 51	19.2		102.15	0.061 0806	1972.6	2.90	7.65	1 33.3
	7	10 36	27.92	13.467	9 10	29.7		101.96	0.056 2845	2024.0	2.93	7.73	1 34.8
	8	10 41	47.18	13.139	8 29	46.4		101.62	0.051 3654	2075.2	2.96	7.82	1 36.2
	9	10 46	58.62	12.815	7 49	12.9		101.15	0.046 3232	2126.6	3.00	7.91	1 37.4
	10	10 52	2.31	+12.493	+ 7 8	52.5		-100.53	0.041 1574	-2178.3	3.04	8.00	1 38.5
	11	10 58	58.30	12.173	6 28	48.6		99.77	0.035 8670	2230.4	3.07	8.10	1 39.5
	12	11 1	46.60	11.853	5 49	4.4		98.88	0.030 4508	2283.1	3.11	8.20	1 40.4
	13	11 6	27.23	11.532	5 9	43.3		97.85	0.024 9073	2336.6	3.15	8.31	1 41.1
	14	11 11	0.12	11.209	4 30	48.6		96.68	0.019 2346	2390.7	3.19	8.42	1 41.7
	15	11 15	25.23	+10.882	+ 3 52	23.9		- 95.36	0.013 4312	-2445.7	3.24	8.53	1 42.2
	16	11 19	42.44	+10.551	+ 3 14	32.6		- 93.89	0.007 4945	-2501.6	3.28	8.65	1 42.5



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	h m
Aug.	h	m	s	s	°	'	"	"			"	"	h m
16	11	19	42.44	+10.551	+3	14	32.6	- 93.89	0.007 4945	-2501.6	3.28	8.65	1 42.5
17	11	23	51.61	10.212	2	37	18.2	92.27	0.001 4228	2558.2	3.32	8.77	1 42.7
18	11	27	52.56	9.866	2	0	44.7	90.49	9.995 2141	2615.8	3.38	8.90	1 42.8
19	11	31	45.08	9.509	1	24	56.0	88.54	9.988 8665	2674.0	3.43	9.03	1 42.7
20	11	35	28.90	9.140	0	49	56.3	86.41	9.982 3785	2732.7	3.47	9.16	1 42.5
21	11	39	3.72	+ 8.758	+0	15	50.0	- 84.09	9.975 7491	-2791.8	3.53	9.31	1 42.1
22	11	42	29.17	8.360	-0	17	18.2	81.57	9.968 9778	2850.9	3.59	9.45	1 41.6
23	11	45	44.85	7.946	0	49	23.4	78.82	9.962 0648	2909.9	3.64	9.60	1 40.9
24	11	48	50.30	7.507	1	20	19.9	75.85	9.955 0110	2968.1	3.70	9.76	1 40.0
25	11	51	45.00	7.047	1	50	2.0	72.62	9.947 8192	3024.9	3.76	9.92	1 39.0
26	11	54	28.38	+ 6.563	-2	18	23.6	- 69.12	9.940 4931	-3079.9	3.83	10.09	1 37.7
27	11	56	59.80	6.050	2	45	17.6	65.33	9.933 0383	3131.8	3.89	10.27	1 36.3
28	11	59	18.56	5.508	3	10	36.8	61.21	9.925 4635	3179.8	3.96	10.45	1 34.7
29	12	1	23.92	4.933	3	34	13.1	56.75	9.917 7793	3222.8	4.03	10.63	1 32.8
30	12	3	15.06	4.323	3	55	57.9	51.92	9.909 9995	3269.1	4.11	10.83	1 30.7
31	12	4	51.13	+ 3.677	-4	15	41.9	- 46.68	9.902 1424	-3287.0	4.18	11.02	1 28.3
Sept.	1	12	6 11.24	2.992	4	33	15.2	41.01	9.894 2304	3304.3	4.26	11.23	1 25.7
	2	12	7 14.44	2.268	4	48	26.9	34.88	9.886 2921	3308.7	4.34	11.43	1 22.8
	3	12	7 59.78	1.504	5	1	5.7	28.26	9.878 3611	3297.6	4.42	11.64	1 19.6
	4	12	8 26.33	+ 0.702	5	10	59.6	21.14	9.870 4789	3267.6	4.50	11.86	1 16.1
	5	12	8 33.18	- 0.137	-5	17	56.3	- 13.49	9.862 6949	-3215.0	4.58	12.07	1 12.3
	6	12	8 19.51	1.007	5	21	42.9	- 5.31	9.855 0681	3136.1	4.67	12.29	1 8.1
	7	12	7 44.61	1.905	5	22	7.2	+ 3.38	9.847 6663	3026.5	4.74	12.50	1 3.6
	8	12	6 47.95	2.819	5	18	56.8	12.56	9.840 5690	2881.7	4.82	12.70	0 58.7
	9	12	5 29.28	3.737	5	12	1.2	22.14	9.833 8662	2696.9	4.90	12.90	0 53.4
	10	12	3 48.64	- 4.646	-5	1	11.3	+ 32.06	9.827 6596	-2467.7	4.97	13.09	0 47.8
	11	12	1 46.49	5.526	4	46	20.9	42.16	9.822 0598	2190.4	5.03	13.26	0 41.9
	12	11	59 23.80	6.354	4	27	27.4	52.28	9.817 1868	1861.7	5.09	13.41	0 35.6
	13	11	56 42.11	7.105	4	4	33.3	62.17	9.813 1660	1480.1	5.13	13.53	0 28.9
	14	11	53 43.60	7.751	3	37	47.1	71.58	9.810 1247	1045.7	5.17	13.63	0 22.1
	15	11	50 31.12	- 8.264	-3	7	23.9	+ 80.20	9.808 1868	- 561.1	5.20	13.69	0 14.9
	16	11	47 8.20	8.617	2	33	46.4	87.71	9.807 4673	- 31.6	5.20	13.71	0 7.7
	17	11	43 39.01	8.783	1	57	25.3	93.79	9.808 0648	+ 534.9	5.20	13.69	0 23 58.3
	18	11	40 8.25	8.745	1	18	58.1	98.16	9.810 0558	1127.5	5.17	13.63	23 45.5
	19	11	36 41.03	8.488	-0	39	9.2	100.56	9.813 4872	1733.0	5.13	13.52	23 38.3
	20	11	33 22.69	- 8.005	+0	1	12.2	+100.86	9.818 3729	+2337.0	5.08	13.37	23 31.3
	21	11	30 18.52	7.306	0	41	14.6	98.97	9.824 6911	2924.0	5.00	13.18	23 24.6
	22	11	27 33.64	6.401	1	20	5.4	94.92	9.832 3827	3479.2	4.92	12.95	23 18.3
	23	11	25 12.72	5.314	1	56	54.5	88.85	9.841 3553	3989.5	4.82	12.68	23 12.5
	24	11	23 19.82	4.071	2	30	55.3	80.94	9.851 4868	4443.3	4.71	12.39	23 7.2
	25	11	21 58.26	- 2.708	+3	1	27.1	+ 71.47	9.862 6313	+4332.5	4.58	12.07	23 2.5
	26	11	21 10.53	- 1.259	3	27	56.0	60.75	9.874 6266	5151.7	4.46	11.74	22 58.3
	27	11	20 58.24	+ 0.240	3	49	55.6	49.08	9.887 3014	5398.4	4.33	11.41	22 54.8
	28	11	21 22.16	1.753	4	7	6.8	36.78	9.900 4812	5573.0	4.20	11.07	22 51.8
	29	11	22 22.26	3.250	4	19	18.3	24.14	9.913 9963	5678.2	4.07	10.73	22 49.4
	30	11	23 57.80	+ 4.702	+4	26	25.1	+ 11.44	9.927 6845	+5718.2	3.95	10.39	22 47.6
Oct.	1	11	26 7.39	+ 6.085	+4	28	28.6	- 1.10	9.941 3965	+5699.2	3.82	10.07	22 46.3

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.		Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.			Noon.	Noon.		Noon.	Noon.	Noon.	Noon.	Noon.	h m
Oct.	1	h m s	s	"	"	"	"	"	"	"	"	h m
	1	11 26 7.39	+ 6.065	+ 4 28 28.6	- 1.10	9.941 3965	+5699.2	3.82	10.07	22 46.3		
	2	11 28 49.18	7.382	4 25 35.4	13.26	9.954 9986	5627.8	3.70	9.76	22 45.6		
	3	11 32 0.93	8.579	4 17 56.6	24.88	9.968 3740	5511.4	3.59	9.46	22 45.3		
	4	11 35 40.12	9.668	4 5 46.5	35.84	9.981 4232	5357.4	3.48	9.18	22 45.4		
	5	11 39 44.09	10.644	3 49 22.5	46.02	9.994 0658	5173.6	3.39	8.92	22 45.8		
	6	11 44 10.12	+11.507	+ 3 29 3.9	- 55.39	0.006 2379	+4966.5	3.29	8.67	22 46.6		
	7	11 48 55.53	12.259	3 5 10.9	63.88	0.017 8917	4742.9	3.21	8.44	22 47.7		
	8	11 53 57.72	12.907	2 38 4.8	71.49	0.028 9951	4508.6	3.12	8.23	22 49.0		
	9	11 59 14.28	13.457	2 8 6.3	78.24	0.039 5283	4268.5	3.05	8.03	22 50.6		
	10	12 4 42.96	13.919	1 35 36.2	84.14	0.049 4825	4026.7	2.98	7.85	22 52.3		
	11	12 10 21.75	+14.301	+ 1 0 54.1	- 89.24	0.058 8582	+3787.1	2.91	7.68	22 54.1		
	12	12 16 8.83	14.610	+ 0 24 18.8	93.58	0.067 6638	3552.0	2.86	7.53	22 56.1		
	13	12 22 2.63	14.862	- 0 13 52.3	97.23	0.075 9128	3323.4	2.81	7.39	22 58.1		
	14	12 28 1.81	15.061	0 53 23.2	100.24	0.083 6227	3103.1	2.76	7.26	23 0.2		
	15	12 34 5.18	15.214	1 33 59.2	102.66	0.090 8150	2892.0	2.72	7.14	23 2.4		
	16	12 40 11.79	+15.331	- 2 15 26.9	-104.56	0.097 5119	+2690.3	2.67	7.03	23 4.6		
	17	12 46 20.83	15.417	2 57 34.5	105.99	0.103 7366	2498.8	2.63	6.93	23 6.8		
	18	12 52 31.63	15.479	3 40 11.2	107.00	0.109 5141	2317.2	2.60	6.84	23 9.1		
	19	12 58 43.66	15.521	4 23 7.5	107.64	0.114 8671	2145.2	2.56	6.75	23 11.4		
	20	13 4 56.51	15.547	5 6 15.0	107.94	0.119 8189	1982.8	2.53	6.68	23 13.6		
	21	13 11 9.84	+15.562	- 5 49 26.1	-107.94	0.124 3916	+1829.3	2.50	6.61	23 15.9		
	22	13 17 23.42	15.568	6 32 34.3	107.69	0.128 6062	1684.2	2.48	6.54	23 18.2		
	23	13 23 37.07	15.568	7 15 33.6	107.21	0.132 4820	1547.1	2.46	6.49	23 20.5		
	24	13 29 50.67	15.565	7 58 18.9	106.53	0.136 0384	1417.6	2.44	6.43	23 22.8		
	25	13 36 4.15	15.559	8 40 45.7	105.67	0.139 2919	1294.8	2.43	6.39	23 25.1		
	26	13 42 17.49	+15.552	- 9 22 49.8	-104.65	0.142 2585	+1178.4	2.41	6.34	23 27.4		
	27	13 48 30.66	15.546	10 4 27.6	103.48	0.144 9528	1067.8	2.39	6.30	23 29.6		
	28	13 54 43.72	15.542	10 45 36.0	102.19	0.147 3883	962.6	2.38	6.27	23 31.9		
	29	14 0 56.69	15.540	11 26 12.0	100.79	0.149 5771	862.2	2.37	6.24	23 34.2		
30	14 7 9.65	15.541	12 6 13.0	99.28	0.151 5302	766.1	2.35	6.21	23 36.5			
Nov.	31	14 13 22.67	+15.545	-12 45 36.7	- 97.68	0.153 2575	+ 674.0	2.34	6.18	23 38.8		
	1	14 19 35.83	15.553	13 24 20.9	95.99	0.154 7682	585.4	2.34	6.16	23 41.0		
	2	14 25 49.23	15.564	14 2 23.5	94.22	0.156 0700	500.0	2.33	6.14	23 43.3		
	3	14 32 2.95	15.580	14 39 42.7	92.37	0.157 1702	417.2	2.33	6.13	23 45.6		
	4	14 38 17.10	15.600	15 16 16.9	90.46	0.158 0748	337.1	2.32	6.11	23 47.9		
	5	14 44 31.76	+15.623	-15 52 4.3	- 88.48	0.158 7899	+ 259.1	2.32	6.10	23 50.2		
	6	14 50 47.04	15.651	16 27 3.4	86.44	0.159 3197	182.7	2.32	6.10	23 52.6		
	7	14 57 3.03	15.682	17 1 12.7	84.33	0.159 6683	108.0	2.32	6.09	23 54.9		
	8	15 3 19.81	15.717	17 34 30.8	82.17	0.159 8394	+ 34.8	2.32	6.09	23 57.3		
	9	15 9 37.47	15.755	18 6 56.2	79.94	0.159 8359	- 37.7	2.32	6.09	23 59.6		
	10	15 15 56.07	+15.796	-18 38 27.6	- 77.67	0.159 6593	- 109.3	2.32	6.09	...		
	11	15 22 15.71	15.841	19 9 3.7	75.33	0.159 3118	180.3	2.32	6.10	0 2.0		
	12	15 28 36.44	15.887	19 38 42.9	72.93	0.158 7942	250.9	2.32	6.10	0 4.4		
	13	15 34 58.32	15.936	20 7 24.1	70.49	0.158 1074	321.5	2.32	6.11	0 6.9		
	14	15 41 21.38	15.966	20 35 6.0	67.99	0.157 2508	392.3	2.33	6.13	0 9.3		
	15	15 47 45.67	+16.038	-21 1 47.0	- 65.42	0.156 2242	- 463.3	2.34	6.14	0 11.8		
16	15 54 11.21	+16.090	-21 27 25.8	- 62.50	0.155 0265	- 534.9	2.34	6.16	0 14.3			

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.	
	Noon.				Noon.									Noon.
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	h	m
Nov.	16	15	54	11.21	+16.090	-21	27	25.8	-62.80	0.155 0265	-534.9	2.34	6.16	0 14.3
	17	16	0	38.01	16.143	21	52	1.2	60.14	0.153 6561	607.3	2.35	6.18	0 16.8
	18	16	7	6.08	16.195	22	15	31.9	57.41	0.152 1107	680.7	2.35	6.20	0 19.3
	19	16	13	35.38	16.246	22	37	56.2	54.61	0.150 3880	755.1	2.36	6.22	0 21.9
	20	16	20	5.90	16.296	22	59	12.9	51.77	0.148 4848	831.2	2.37	6.25	0 24.4
	21	16	26	37.59	+16.344	-23	19	20.7	-48.86	0.146 3970	-908.8	2.38	6.28	0 27.0
	22	16	33	10.37	16.388	23	38	17.9	45.89	0.144 1209	988.3	2.39	6.31	0 29.6
	23	16	39	44.17	16.428	23	56	3.2	42.87	0.141 6515	1069.9	2.41	6.35	0 32.3
	24	16	46	18.87	16.463	24	12	35.3	39.79	0.138 9834	1154.0	2.43	6.39	0 34.9
	25	16	52	54.35	16.492	24	27	52.8	36.65	0.136 1100	1240.8	2.44	6.43	0 37.6
Dec.	26	16	59	30.45	+16.515	-24	41	54.0	-33.44	0.133 0253	-1330.4	2.46	6.48	0 40.2
	27	17	6	6.99	16.529	24	54	37.7	30.19	0.129 7214	1423.4	2.48	6.53	0 42.9
	28	17	12	43.74	16.532	25	6	2.6	26.87	0.126 1902	1520.0	2.49	6.58	0 45.6
	29	17	19	20.45	16.525	25	16	7.1	23.50	0.122 4225	1620.4	2.52	6.64	0 48.2
	30	17	25	56.84	16.505	25	24	50.3	20.08	0.118 4087	1725.1	2.54	6.70	0 50.9
	1	17	32	32.57	+16.470	-25	32	10.6	-16.60	0.114 1381	-1834.5	2.57	6.77	0 53.6
	2	17	39	7.24	16.417	25	38	7.0	13.09	0.109 5991	1948.9	2.60	6.84	0 56.2
	3	17	45	40.43	16.345	25	42	38.5	9.53	0.104 7794	2068.5	2.62	6.91	0 58.8
	4	17	52	11.61	16.250	25	45	44.1	5.94	0.099 6659	2193.9	2.66	6.99	1 1.4
	5	17	58	40.24	16.130	25	47	23.2	-2.32	0.094 2438	2325.4	2.69	7.08	1 3.9
	6	18	5	5.63	+15.981	-25	47	35.1	+1.32	0.088 4990	-2463.2	2.73	7.18	1 6.4
	7	18	11	27.07	15.799	25	46	19.6	4.97	0.082 4150	2607.9	2.77	7.28	1 8.8
	8	18	17	43.70	15.590	25	43	36.6	8.61	0.075 9754	2759.6	2.81	7.39	1 11.2
	9	18	23	54.57	15.319	25	39	26.5	12.23	0.069 1633	2918.5	2.85	7.50	1 13.4
	10	18	29	58.60	15.009	25	33	50.0	15.81	0.061 9610	3084.6	2.89	7.63	1 15.5
	11	18	35	54.55	+14.645	-25	26	48.3	+19.32	0.054 3512	-3258.1	2.94	7.76	1 17.5
	12	18	41	41.05	14.219	25	18	23.2	22.75	0.046 3164	3438.6	3.00	7.91	1 19.3
	13	18	47	16.52	13.724	25	8	37.2	26.07	0.037 8408	3625.5	3.06	8.06	1 21.0
	14	18	52	39.19	13.151	24	57	33.2	29.24	0.028 9096	3817.9	3.12	8.23	1 22.4
	15	18	57	47.05	12.489	24	45	15.3	32.21	0.019 5114	4014.6	3.19	8.41	1 23.6
	16	19	2	37.88	+11.729	-24	31	48.7	+34.96	0.009 6378	-4213.6	3.26	8.61	1 24.4
	17	19	7	9.17	10.859	24	17	19.2	37.44	9.999 2866	4412.0	3.34	8.81	1 25.0
	18	19	11	18.16	9.869	24	1	54.1	39.00	9.988 4635	4606.1	3.43	9.04	1 25.2
	19	19	15	1.82	8.747	23	45	41.5	41.38	9.977 1843	4791.2	3.52	9.27	1 24.9
	20	19	18	16.86	7.482	23	28	51.2	42.74	9.965 4778	4961.0	3.62	9.53	1 24.2
	21	19	20	59.78	+6.069	-23	11	33.8	+43.62	9.953 3897	-5107.9	3.72	9.80	1 22.9
	22	19	23	6.94	4.502	22	54	1.3	44.00	9.940 9859	5222.4	3.82	10.08	1 21.1
	23	19	24	34.68	2.784	22	36	26.1	43.84	9.928 3572	5293.3	3.94	10.38	1 18.6
24	19	25	19.44	+0.924	22	19	1.4	43.12	9.915 6228	5308.2	4.06	10.69	1 15.4	
25	19	25	18.07	-1.057	22	2	0.6	41.86	9.902 9333	5253.6	4.17	11.00	1 11.4	
26	19	24	28.02	-3.125	-21	45	36.2	+40.07	9.890 4724	-5115.5	4.30	11.32	1 6.6	
27	19	22	47.77	5.231	21	30	0.1	37.86	9.878 4563	4880.9	4.42	11.64	1 0.9	
28	19	20	17.14	7.310	21	15	22.0	35.25	9.867 1291	4540.2	4.54	11.95	0 54.5	
29	19	16	57.72	9.283	21	1	50.3	32.35	9.856 7527	4088.1	4.65	12.24	0 47.2	
30	19	12	53.11	11.063	20	49	31.0	29.24	9.847 5942	3526.1	4.74	12.50	0 39.2	
31	19	8	9.10	-12.551	-20	38	28.0	+25.90	9.839 9078	-2863.9	4.83	12.72	0 30.6	
32	19	2	53.57	.....	-20	28	44.2	.....	9.833 9126	.....	4.90	12.90	0 21.4	

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		" " "	" " "	" "	" " "	" "		
Jan.	1	12 18 53.7	5 10 27.6	-12 6.9	-4 2 0.9	+31 4.4	9.531 6416	-66667
	2	17 33 55.3	5 19 35.2	11 7.2	3 29 29.8	33 56.8	9.525 0804	64402
	3	22 58 1.9	5 28 36.3	9 42.2	2 54 10.3	36 40.4	9.518 7880	61306
	4	28 31 3.1	5 37 23.0	7 53.3	2 16 13.8	39 9.8	9.512 8476	57359
	5	34 12 40.0	5 45 46.0	5 43.0	1 35 57.1	41 19.8	9.507 3454	52538
	6	40 2 23.9	5 53 35.4	- 3 15.5	-0 53 42.6	+43 4.4	9.502 3694	-46839
	7	45 59 36.3	6 0 41.0	- 0 36.6	-0 9 58.8	44 17.6	9.498 0059	40294
	8	52 3 27.8	6 6 51.9	+ 2 6.9	+0 34 40.5	44 54.5	9.494 3367	32967
	9	58 12 58.4	6 11 57.7	4 47.0	1 19 36.7	44 51.0	9.491 4351	24964
	10	64 26 58.4	6 15 49.2	7 15.5	2 4 7.9	44 4.1	9.489 3616	16431
	11	70 44 9.3	6 18 18.4	+ 9 24.2	+2 47 30.1	+42 33.1	9.488 1611	- 7532
	12	77 3 5.9	6 19 19.9	11 6.1	3 28 59.8	40 19.4	9.487 8608	+ 1538
	13	83 22 18.8	6 18 50.7	12 15.6	4 7 55.9	37 26.6	9.488 4674	10671
	14	89 40 17.0	6 16 50.6	12 49.2	4 43 41.6	33 59.6	9.489 9671	19367
	15	95 55 30.8	6 13 22.8	12 45.9	5 15 46.1	30 5.4	9.492 3266	27740
	16	102 6 35.2	6 8 33.0	+12 7.0	+5 43 45.9	+25 51.6	9.495 4954	+35526
	17	108 12 12.0	6 2 29.1	10 55.7	6 7 25.5	21 26.3	9.499 4080	42598
	18	114 11 12.1	5 55 21.4	9 17.1	6 26 37.3	16 57.2	9.503 9881	48864
	19	120 2 37.2	5 47 21.0	7 17.3	6 41 21.0	12 31.2	9.509 1519	54268
	20	125 45 40.2	5 38 39.2	5 2.8	6 51 42.7	8 14.2	9.514 8122	58792
	21	131 19 45.7	5 29 27.8	+ 2 40.5	+6 57 53.9	+ 4 10.8	9.520 8812	+62445
	22	136 44 29.5	5 19 57.5	+ 0 16.3	7 0 10.1	+ 0 24.6	9.527 2734	65266
	23	141 59 37.7	5 10 18.0	- 2 4.2	6 58 49.5	- 3 2.5	9.533 9082	67304
	24	147 5 5.4	5 0 38.0	4 16.6	6 54 11.9	6 9.4	9.540 7108	68624
	25	152 0 55.8	4 51 4.4	6 17.1	6 46 37.7	8 55.6	9.547 6114	69297
	26	156 47 18.5	4 41 43.4	- 8 3.4	+6 36 27.3	-11 22.0	9.554 5506	+69398
	27	161 24 28.4	4 32 39.5	9 33.6	6 24 0.2	13 29.2	9.561 4743	68996
	28	165 52 44.4	4 23 56.1	10 46.8	6 9 35.0	15 18.4	9.568 3355	68163
	29	170 12 28.2	4 15 35.4	11 42.9	5 53 28.8	16 51.3	9.575 0947	66962
	30	174 24 3.6	4 7 39.6	12 22.0	5 35 57.3	18 9.4	9.581 7176	65448
	31	178 27 55.9	4 0 9.2	-12 44.8	+5 17 14.4	-19 14.2	9.588 1759	+63677
Feb.	1	182 24 30.7	3 53 4.8	12 52.3	4 57 33.0	20 6.9	9.594 4460	61694
	2	186 14 14.0	3 46 26.2	12 45.6	4 37 4.1	20 49.3	9.600 5088	59535
	3	189 57 31.5	3 40 13.0	12 26.0	4 15 57.5	21 22.4	9.606 3483	57235
	4	193 34 48.3	3 34 24.8	11 54.7	3 54 21.9	21 47.6	9.611 9522	54826
	5	197 6 29.2	3 29 0.8	-11 13.3	+3 32 24.7	-22 5.8	9.617 3107	+52332
	6	200 32 57.8	3 24 0.2	10 23.0	3 10 12.3	22 18.0	9.622 4163	49770
	7	203 54 37.0	3 19 21.8	9 25.1	2 47 50.4	22 25.0	9.627 2632	47162
	8	207 11 48.6	3 15 5.0	8 21.0	2 25 23.9	22 27.4	9.631 8475	44519
	9	210 24 53.8	3 11 8.7	7 11.7	2 2 56.9	22 26.0	9.636 1662	41852
	10	213 34 12.5	3 7 31.9	- 5 58.5	+1 40 33.0	-22 21.2	9.640 2175	+39172
	11	216 40 3.8	3 4 13.8	4 42.3	1 18 15.4	22 13.6	9.644 0004	36486
	12	219 42 46.1	3 1 13.7	3 24.2	0 56 6.6	22 3.6	9.647 5145	33796
	13	222 42 36.9	2 58 30.6	2 5.0	0 34 9.0	21 51.2	9.650 7597	31110
	14	225 39 52.8	2 56 3.9	- 0 45.5	+0 12 24.7	21 37.1	9.653 7368	28432
	15	228 34 49.9	2 53 52.8	+ 0 33.3	-0 9 4.6	-21 21.2	9.656 4464	+25760
	16	231 27 43.4	2 51 56.8	+ 1 50.9	-0 30 17.3	-21 4.0	9.658 8892	+23068

## FOR GREENWICH MEAN NOON.

Date.		Helio-centric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Helio-centric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	° ' "	' "	° ' "	' "		
Feb.	16	231 27 43.4	2 51 56.8	+ 1 50.9	-0 30 17.3	-21 4.0	9.658 8892	+23098
	17	234 18 48.3	2 50 15.4	3 6.6	0 51 12.1	20 45.4	9.661 0663	20446
	18	237 8 18.8	2 48 48.0	4 19.7	1 11 47.6	20 25.4	9.662 9788	17805
	19	239 56 28.8	2 47 34.2	5 29.8	1 32 2.6	20 4.5	9.664 6276	15173
	20	242 43 31.6	2 46 32.6	6 36.2	1 51 56.2	19 42.4	9.666 0137	12550
	21	245 29 40.4	2 45 46.0	+ 7 38.5	-2 11 27.1	-19 19.2	9.667 1379	+ 9935
	22	248 15 7.9	2 45 11.0	8 36.3	2 30 34.4	18 55.2	9.668 0009	7326
	23	251 0 6.7	2 44 48.6	9 29.1	2 49 17.1	18 30.0	9.668 6033	4722
	24	253 44 49.3	2 44 38.6	10 16.5	3 7 34.1	18 3.8	9.668 9454	+ 2120
	25	256 29 27.9	2 44 40.6	10 58.3	3 25 24.2	17 36.3	9.669 0274	- 480
	26	259 14 14.7	2 44 55.0	+11 34.0	-3 42 46.3	-17 7.7	9.668 8495	- 3080
	27	261 59 22.0	2 45 21.6	12 3.3	3 59 39.2	16 37.8	9.668 4114	5684
	28	264 45 1.9	2 46 0.4	12 26.0	4 16 1.5	16 6.6	9.667 7127	8289
Mar.	1	267 31 26.9	2 46 51.6	12 41.9	4 31 51.9	15 33.8	9.666 7534	10900
	2	270 18 49.2	2 47 55.2	12 50.6	4 47 8.6	14 59.4	9.665 5325	13518
	3	273 7 21.7	2 49 11.8	+12 52.0	-5 1 50.0	-14 23.2	9.664 0494	-16145
	4	275 57 17.2	2 50 41.4	12 45.8	5 15 54.2	13 44.8	9.662 3032	18780
	5	278 48 48.8	2 52 24.2	12 32.1	5 29 19.0	13 4.4	9.660 2931	21425
	6	281 42 10.1	2 54 20.7	12 10.6	5 42 2.2	12 21.5	9.658 0179	24080
	7	284 37 34.9	2 56 31.3	11 41.4	5 54 1.1	11 35.9	9.655 4767	26746
	8	287 35 17.6	2 58 56.6	+11 4.3	-6 5 13.0	-10 47.3	9.652 6684	-29420
	9	290 35 33.0	3 1 36.8	10 19.6	6 15 34.6	9 55.4	9.649 5925	32102
	10	293 38 36.4	3 4 32.7	9 27.2	6 25 2.7	9 0.0	9.646 2479	34790
	11	296 44 43.8	3 7 44.8	8 27.4	6 33 33.4	8 0.6	9.642 6345	37478
	12	299 54 11.7	3 11 13.8	7 20.4	6 41 2.5	6 56.8	9.638 7525	40162
	13	303 7 17.3	3 15 0.3	+ 6 6.8	-6 47 25.5	- 5 48.3	9.634 6025	-42838
	14	306 24 18.4	3 19 5.1	4 46.9	6 52 37.4	4 34.6	9.630 1855	45498
	15	309 45 33.8	3 23 28.8	3 21.5	6 56 32.8	3 15.2	9.625 5038	48130
	16	313 11 22.6	3 28 12.2	1 51.3	6 59 5.8	1 49.6	9.620 5608	50722
	17	316 42 4.9	3 33 15.8	+ 0 17.4	7 0 9.9	- 0 17.5	9.615 3612	53260
	18	320 18 1.3	3 38 40.6	- 1 19.1	-6 59 38.4	+ 1 21.8	9.609 9111	-55727
	19	323 59 33.3	3 44 27.0	2 56.8	6 57 23.9	3 8.5	9.604 2190	58098
	20	327 47 2.6	3 50 35.3	4 34.2	6 53 18.7	5 3.4	9.598 2956	60348
	21	331 40 51.4	3 57 6.2	6 9.2	6 47 14.4	7 6.5	9.592 1544	62447
	22	335 41 22.4	4 3 59.6	7 39.9	6 39 2.8	9 18.4	9.585 8125	64358
	23	339 48 58.0	4 11 15.4	- 9 4.0	-6 28 35.0	+11 38.7	9.579 2905	-66041
	24	344 4 0.5	4 18 53.1	10 18.9	6 15 42.6	14 7.6	9.572 6137	67444
	25	348 26 51.2	4 26 51.8	11 21.9	6 0 17.1	16 44.8	9.565 8129	68514
	26	352 57 50.7	4 35 10.1	12 10.4	5 42 10.6	19 29.4	9.558 9239	69197
	27	357 37 17.3	4 43 45.8	12 41.4	5 21 16.3	22 20.2	9.551 9888	69422
Apr.	28	2 25 27.2	4 52 36.2	-12 52.3	-4 57 28.7	+25 15.5	9.545 0572	-69118
	29	7 22 33.2	5 1 37.3	12 41.0	4 30 44.5	28 13.0	9.538 1854	68212
	30	12 28 43.8	5 10 44.4	12 5.5	4 1 2.8	31 9.8	9.531 4373	66634
	31	17 44 2.2	5 19 51.9	11 4.9	3 28 26.4	34 2.0	9.524 8834	64314
	1	23 8 25.4	5 28 52.8	9 39.2	2 53 1.8	36 45.2	9.518 6012	61194
	2	28 41 42.7	5 37 38.6	- 7 49.5	-2 15 0.7	+39 14.2	9.512 6731	-57222
	3	34 23 34.8	5 46 0.8	- 5 38.7	-1 34 40.0	+41 23.4	9.507 1862	-52370

## FOR GREENWICH MEAN NOON.

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		° ' "	° ' "	' "	° ' "	' "		
Apr.	1	23 8 25.4	5 28 52.8	- 9 39.2	-2 53 1.8	+36 45.2	9.518 6012	-61194
	2	28 41 42.7	5 37 38.6	7 49.5	2 15 0.7	39 14.2	9.512 6731	57222
	3	34 23 34.8	5 46 0.8	5 38.7	1 34 40.0	41 23.4	9.507 1862	52370
	4	40 13 33.0	5 53 49.1	3 10.8	0 52 22.4	43 7.1	9.502 2282	46645
	5	46 10 58.2	6 0 53.0	- 0 31.6	-0 8 36.3	44 19.4	9.497 8854	40075
	6	52 15 0.8	6 7 2.0	+ 2 11.9	+0 36 4.1	+44 55.0	9.494 2393	-32728
	7	58 24 40.4	6 12 5.6	4 51.8	1 21 0.1	44 50.0	9.491 3624	24707
	8	64 38 47.1	6 15 54.6	7 19.8	2 5 29.7	44 1.8	9.489 3156	16157
	9	70 56 2.1	6 18 21.2	9 27.8	2 48 49.0	42 29.6	9.488 1429	- 7252
	10	77 15 0.1	6 19 20.0	11 8.7	3 30 14.6	40 14.8	9.487 8708	+ 1818
	11	83 34 11.7	6 18 48.0	+12 17.1	+4 9 5.3	+37 20.6	9.488 5052	+10847
	12	89 52 5.7	6 16 45.0	12 49.7	4 44 44.5	33 52.8	9.490 0321	19633
	13	96 7 12.6	6 13 14.6	12 45.3	5 16 41.7	29 57.8	9.492 4174	27988
	14	102 18 7.6	6 8 22.3	12 5.2	5 44 33.7	25 43.6	9.495 6101	35755
	15	108 23 32.7	6 2 16.5	10 53.1	6 8 5.1	21 18.0	9.499 5443	42801
	16	114 22 19.3	5 55 7.0	+ 9 13.7	+6 27 8.6	+16 48.9	9.504 1433	+49040
	17	120 13 29.1	5 47 5.0	7 13.3	6 41 44.0	12 23.0	9.509 3235	54418
	18	125 56 15.7	5 38 22.3	4 58.6	6 51 57.8	8 6.4	9.514 9974	58914
	19	131 30 3.9	5 29 10.2	2 36.0	6 58 1.5	4 3.6	9.521 0773	62542
	20	136 54 29.9	5 19 39.6	+ 0 11.9	7 0 10.8	+ 0 17.9	9.527 4780	65336
	21	142 9 20.0	5 9 59.9	- 2 8.4	+6 58 43.8	- 3 8.6	9.534 1185	+67350
	22	147 14 29.6	5 0 20.0	4 20.4	6 54 0.5	6 14.7	9.540 9243	68652
	23	152 10 2.2	4 50 46.8	6 20.6	6 46 21.2	9 0.4	9.547 8272	69305
	24	156 56 7.5	4 41 26.3	8 6.4	6 36 6.3	11 26.2	9.554 7663	69388
	25	161 33 0.6	4 32 22.0	9 36.1	6 23 35.3	13 32.7	9.561 6883	68974
	26	166 1 0.4	4 23 40.2	-10 48.8	+6 9 6.8	-15 21.5	9.568 5468	+68130
	27	170 20 28.7	4 15 20.5	11 44.4	5 52 57.7	16 54.0	9.575 3020	66917
	28	174 31 49.6	4 7 25.4	12 23.0	5 35 23.8	18 11.6	9.581 9200	65396
	29	178 35 28.0	3 59 55.8	12 45.3	5 16 39.0	19 15.9	9.588 3727	63617
	30	182 31 49.7	3 52 52.1	12 52.3	4 56 56.0	20 8.4	9.594 6864	61627
May	1	186 21 20.8	3 46 14.3	-12 45.2	+4 36 25.8	-20 50.4	9.600 6923	+59464
	2	190 4 26.8	3 40 2.0	12 25.2	4 15 18.2	21 23.4	9.606 5246	57162
	3	193 41 33.0	3 34 14.6	11 53.6	3 53 41.8	21 48.2	9.612 1210	54749
	4	197 13 3.9	3 28 51.2	11 11.9	3 31 44.0	22 6.2	9.617 4716	52252
	5	200 39 23.3	3 23 51.4	10 21.3	3 9 31.3	22 18.2	9.622 5692	49690
	6	204 0 54.0	3 19 13.8	- 9 23.2	+2 47 9.2	-22 25.1	9.627 4080	+47079
	7	207 17 57.9	3 14 57.6	8 18.9	2 24 42.6	22 27.4	9.631 9839	44436
	8	210 30 55.9	3 11 1.8	7 9.5	2 2 15.6	22 25.9	9.636 2944	41769
	9	213 40 8.0	3 7 25.6	5 56.2	1 39 51.9	22 21.0	9.640 3372	39088
	10	216 45 53.3	3 4 8.1	4 39.9	1 17 34.4	22 13.4	9.644 1117	36400
	11	219 48 30.2	3 1 8.5	- 3 21.7	+0 55 25.9	-22 3.2	9.647 6173	+33713
	12	222 48 16.0	2 58 26.0	2 2.5	0 33 28.7	21 50.8	9.650 8544	31028
	13	225 45 27.5	2 55 59.7	- 0 43.1	+0 11 44.9	21 36.6	9.653 8230	28348
	14	228 40 20.6	2 53 49.1	+ 0 35.7	-0 9 44.0	21 20.8	9.656 5244	25679
	15	231 33 10.7	2 51 53.6	1 53.3	0 30 56.2	21 3.4	9.658 9591	23018
	16	234 24 12.6	2 50 12.6	+ 3 8.9	-0 51 50.3	-20 44.7	9.661 1283	+20367
	17	237 13 40.5	2 48 45.4	+ 4 21.9	-1 12 25.2	-20 24.9	9.663 0828	+17725

## FOR GREENWICH MEAN NOON

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		" ' "	" ' "	" "	" ' "	" "		
May	17	237 13 40.5	2 48 45.4	+ 4 21.9	-1 12 25.2	-20 24.9	9.663 0328	+17725
	18	240 1 48.2	2 47 32.1	5 31.9	1 32 39.7	20 3.8	9.664 6736	15094
	19	242 48 49.3	2 46 32.0	6 38.2	1 52 32.5	19 41.7	9.666 0518	12472
	20	245 34 56.6	2 45 44.8	7 40.4	2 12 2.8	19 18.6	9.667 1681	9856
	21	248 20 23.1	2 45 10.2	8 38.0	2 31 9.4	18 54.4	9.668 0231	7246
	22	251 5 21.3	2 44 48.2	+ 9 30.6	-2 49 51.3	-18 29.2	9.668 6176	+ 4642
	23	253 50 3.6	2 44 38.5	10 17.9	3 8 7.4	18 2.9	9.668 9517	+ 2040
	24	256 34 42.4	2 44 41.0	10 59.5	3 25 56.7	17 35.4	9.669 0257	- 559
	25	259 19 29.7	2 44 55.6	11 35.0	3 43 17.9	17 6.8	9.668 8399	3159
	26	262 4 37.8	2 45 22.6	12 4.1	4 0 9.9	16 37.0	9.668 3938	5762
	27	264 50 19.0	2 46 1.8	+12 26.6	-4 16 31.3	-16 5.6	9.667 6874	- 8367
	28	267 36 45.5	2 46 53.4	12 42.2	4 32 20.6	15 32.8	9.666 7202	10979
	29	270 24 9.9	2 47 57.4	12 50.7	4 47 36.3	14 58.3	9.665 4914	13598
	30	273 12 44.7	2 49 14.3	12 51.9	5 2 16.6	14 22.0	9.664 0005	16223
	31	276 2 42.9	2 50 44.3	12 45.5	5 16 19.6	13 43.7	9.662 2465	18860
June	1	278 54 17.7	2 52 27.5	+12 31.6	-5 29 43.2	-13 3.1	9.660 2283	-21505
	2	281 47 42.5	2 54 24.4	12 9.8	5 42 25.0	12 20.1	9.657 9452	24160
	3	284 43 11.3	2 56 35.6	11 40.4	5 54 22.5	11 34.4	9.655 3960	26826
	4	287 40 58.4	2 59 1.2	11 3.1	6 5 32.9	10 45.8	9.652 5797	29500
	5	290 41 18.6	3 1 41.9	10 18.1	6 15 53.0	9 53.8	9.649 4957	32181
	6	293 44 27.4	3 4 38.3	+ 9 25.4	-6 25 19.3	- 8 58.2	9.646 1433	-34870
	7	296 50 40.6	3 7 50.9	8 25.4	6 33 48.1	7 58.6	9.642 5218	37558
	8	300 0 14.8	3 11 20.4	7 18.3	6 41 15.2	6 54.8	9.638 6318	40243
	9	303 13 27.2	3 15 7.4	6 4.4	6 47 36.1	5 46.2	9.634 4735	42918
	10	306 30 35.7	3 19 12.6	4 44.4	6 52 45.8	4 32.2	9.630 0487	45576
	11	309 51 59.0	3 23 37.1	+ 3 18.8	-6 56 38.7	- 3 12.6	9.625 3591	-48208
	12	313 17 56.4	3 28 21.0	1 48.5	6 59 9.1	1 47.0	9.620 4084	50799
	13	316 48 47.8	3 33 25.4	+ 0 14.5	7 0 10.4	- 0 14.6	9.615 2011	53336
	14	320 24 54.1	3 38 50.7	- 1 22.1	6 59 35.9	+ 1 24.9	9.609 7437	55799
	15	324 6 36.4	3 44 37.6	2 59.8	6 57 18.1	3 12.0	9.604 0445	58168
	16	327 54 16.7	3 50 46.7	- 4 37.1	-6 53 9.3	+ 5 7.0	9.598 1143	-60414
	17	331 48 17.3	3 57 18.2	6 12.1	6 47 1.3	7 10.4	9.591 9668	62508
	18	335 49 0.7	4 4 12.3	7 42.6	6 38 45.6	9 22.4	9.585 6191	64412
	19	339 56 49.4	4 11 28.8	9 6.5	6 28 13.6	11 43.1	9.579 0920	66086
	20	344 12 5.6	4 19 7.2	10 21.0	6 15 16.6	14 12.3	9.572 4111	67482
	21	348 35 10.7	4 27 6.4	-11 23.7	-5 59 46.3	+16 49.7	9.565 6068	-68542
	22	353 6 25.0	4 35 25.4	12 11.6	5 41 34.8	19 34.5	9.558 7157	69210
	23	357 46 7.2	4 44 1.6	12 42.0	5 20 35.3	22 25.5	9.551 7800	69420
	24	2 34 33.0	4 52 52.2	12 52.3	4 56 42.4	25 20.8	9.544 8493	69100
	25	7 31 55.3	5 1 53.6	12 40.2	4 29 52.8	28 18.5	9.537 9802	68176
	26	12 38 22.3	5 11 0.9	-12 4.0	-4 0 5.8	+31 15.1	9.531 2366	-66576
	27	17 53 57.2	5 20 8.3	11 2.6	3 27 24.1	34 7.2	9.524 6896	64235
	28	23 18 36.6	5 29 8.7	9 36.1	2 51 54.6	36 50.0	9.518 4165	61087
	29	28 52 9.7	5 37 54.2	7 45.8	2 13 49.0	39 18.4	9.512 5006	57088
	30	34 34 17.0	5 46 15.6	5 34.4	1 33 24.4	41 27.0	9.507 0281	52213
July	1	40 24 29.4	5 54 2.6	- 3 6.1	-0 51 3.6	+43 9.8	9.502 0873	-46461
	2	46 22 7.4	6 1 5.0	- 0 26.6	-0 7 15.4	+44 21.0	9.497 7641	-39866



## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		" ' "	" ' "	" "	" ' "	" "		
July	1	40 24 29.4	5 54 2.6	- 3 6.1	-0 51 3.6	+43 9.8	9.502 0873	-46461
	2	46 22 7.4	6 1 5.0	- 0 26.6	-0 7 15.4	44 21.0	9.497 7641	39866
	3	52 26 21.1	6 7 12.2	+ 2 16.9	+0 37 26.0	44 55.4	9.494 1399	32496
	4	58 36 10.0	6 12 13.8	4 56.6	1 22 21.9	44 49.3	9.491 2872	24459
	5	64 50 23.7	6 16 0.4	7 24.0	2 6 50.1	43 59.8	9.489 2658	15894
	6	71 7 43.2	6 18 24.4	+ 9 31.3	+2 50 6.6	+42 26.0	9.488 1201	- 6979
	7	77 26 43.2	6 19 20.5	11 11.3	3 31 28.0	40 9.9	9.487 8751	+ 2089
	8	83 45 53.9	6 18 45.6	12 18.7	4 10 13.4	37 14.8	9.488 5365	11116
	9	90 3 44.3	6 16 40.2	12 50.1	4 45 46.3	33 46.0	9.490 0899	19892
	10	96 18 45.1	6 13 7.2	12 44.6	5 17 36.4	29 50.4	9.492 5004	28232
	11	102 29 31.4	6 8 12.4	+12 3.5	+5 45 20.6	+25 35.6	9.495 7165	+35978
	12	108 34 45.6	6 2 4.5	10 50.4	6 8 43.9	21 9.8	9.499 6719	43002
	13	114 33 19.3	5 54 53.3	9 10.3	6 27 39.2	16 40.8	9.504 2897	49216
	14	120 24 14.8	5 46 50.0	7 9.4	6 42 6.6	12 15.2	9.509 4861	54567
	15	126 6 45.7	5 38 6.2	4 54.3	6 52 12.6	7 58.8	9.515 1736	59037
	16	131 40 17.5	5 28 53.4	+ 2 31.6	+6 58 8.9	+ 3 56.4	9.521 2645	+62640
	17	137 4 26.4	5 19 22.2	+ 0 7.5	7 0 11.2	+ 0 11.3	9.527 6737	65409
	18	142 18 59.1	5 9 42.5	- 2 12.6	6 58 38.0	- 3 14.6	9.534 3203	67400
	19	147 23 51.4	5 0 2.6	4 24.3	6 53 48.9	6 20.2	9.541 1300	68680
	20	152 19 6.7	4 50 29.8	6 24.1	6 46 4.6	9 5.2	9.548 0348	69318
	21	157 4 55.2	4 41 9.8	- 8 9.4	+6 35 45.2	-11 30.2	9.554 9745	+69386
	22	161 41 32.0	4 32 7.0	9 38.6	6 23 10.4	13 36.3	9.561 8954	68956
	23	166 9 16.1	4 23 24.8	10 50.8	6 8 38.5	15 24.6	9.568 7515	68100
	24	170 28 29.4	4 15 5.8	11 45.8	5 52 26.6	16 56.6	9.575 5032	66878
	25	174 39 35.9	4 7 11.4	12 23.9	5 34 50.3	18 13.8	9.582 1167	65346
	26	178 43 0.8	3 59 42.6	-12 45.7	+5 16 3.5	-19 17.7	9.588 5641	+63562
	27	182 39 9.8	3 52 39.7	12 52.3	4 56 18.8	20 9.8	9.594 8221	61566
	28	186 28 28.8	3 46 2.6	12 44.8	4 35 47.3	20 51.6	9.600 8716	59397
	29	190 11 23.6	3 39 51.2	12 24.4	4 14 38.7	21 24.2	9.606 6970	57092
	30	193 48 19.4	3 34 4.4	11 52.5	3 53 1.5	21 49.0	9.612 2863	54678
	31	197 19 40.5	3 28 41.8	-11 10.4	+3 31 3.1	-22 6.8	9.617 6296	+52178
Aug.	1	200 45 50.9	3 23 42.6	10 19.6	3 8 50.0	22 18.6	9.622 7196	49618
	2	204 7 13.1	3 19 5.6	9 21.4	2 46 27.7	22 25.2	9.627 5506	47002
	3	207 24 9.2	3 14 50.0	8 16.8	2 24 1.0	22 27.4	9.632 1188	44358
	4	210 37 0.0	3 10 54.9	7 7.3	2 1 34.1	22 25.8	9.636 4213	41688
	5	213 46 5.5	3 7 19.4	- 5 53.9	+1 39 10.5	-22 21.0	9.640 4561	+39008
	6	216 51 44.9	3 4 2.4	4 37.5	1 16 53.2	22 13.1	9.644 2226	36322
	7	219 54 16.3	3 1 3.2	3 19.3	0 54 45.1	22 2.8	9.647 7203	33632
	8	222 53 57.1	2 58 21.2	2 0.1	0 32 48.3	21 50.4	9.650 9492	30948
	9	225 51 4.1	2 55 55.4	- 0 40.6	+0 11 4.8	21 36.2	9.653 9101	28270
	10	228 45 53.1	2 53 45.3	+ 0 38.1	-0 10 23.5	-21 20.2	9.656 6035	+25600
	11	231 38 39.7	2 51 50.2	1 55.7	0 31 35.2	21 2.8	9.659 0303	22937
	12	234 29 38.4	2 50 9.6	3 11.2	0 52 28.8	20 44.2	9.661 1913	20286
	13	237 19 3.5	2 48 43.0	4 24.1	1 13 3.1	20 24.2	9.663 0879	17646
	14	240 7 9.0	2 47 30.1	5 34.0	1 33 16.8	20 3.2	9.664 7209	15015
	15	242 54 8.1	2 46 30.3	+ 6 40.2	-1 53 9.0	-19 41.0	9.666 0912	+12392
	16	245 40 13.9	2 45 43.4	+ 7 42.2	-2 12 38.5	-19 17.9	9.667 1996	+ 9777

## FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
	" ' "	" ' "	" ' "	" ' "	" ' "		
Aug. 16	245 40 13.9	2 45 43.4	+ 7 42.2	-2 12 38.5	-19 17.9	9.667 1996	+ 9777
17	248 25 39.2	2 45 9.2	8 39.7	2 31 44.4	18 53.7	9.668 0468	7168
18	251 10 36.6	2 44 47.6	9 32.2	2 50 25.5	18 28.4	9.668 6333	4564
19	253 55 18.5	2 44 38.2	10 19.3	3 8 40.8	18 2.0	9.668 9596	+ 1962
20	256 39 57.2	2 44 41.1	11 0.6	3 26 29.2	17 34.6	9.669 0258	- 638
21	259 24 44.8	2 44 56.2	+11 36.0	-3 43 49.6	-17 5.9	9.668 8321	- 3237
22	262 9 53.6	2 45 23.4	12 4.9	4 0 40.6	16 35.9	9.668 3783	5839
23	264 55 35.8	2 46 3.0	12 27.2	4 17 1.0	16 4.6	9.667 6641	8446
24	267 42 3.8	2 46 55.0	12 42.6	4 32 49.3	15 31.8	9.666 6889	11059
25	270 29 30.0	2 47 59.4	12 50.9	4 48 3.9	14 57.2	9.665 4521	13677
26	273 18 7.0	2 49 16.7	+12 51.8	-5 2 43.1	-14 20.8	9.663 9532	-16304
27	276 8 7.8	2 50 47.1	12 45.2	5 16 44.9	13 42.4	9.662 1911	18940
28	278 59 45.6	2 52 30.7	12 31.0	5 30 7.2	13 1.8	9.660 1649	21586
29	281 53 13.8	2 54 28.1	12 9.1	5 42 47.7	12 18.8	9.657 8735	24242
30	284 48 46.5	2 56 39.6	11 39.3	5 54 43.8	11 33.0	9.655 3161	26908
31	287 46 37.9	2 59 8.7	+11 1.8	-6 5 52.6	-10 44.2	9.652 4915	-29583
Sept. 1	290 47 2.9	3 1 46.9	10 16.6	6 16 11.1	9 52.2	9.649 3993	32204
2	293 50 16.9	3 4 43.8	9 23.7	6 25 35.7	8 56.4	9.646 0385	34950
3	296 56 35.8	3 7 56.8	8 23.4	6 34 2.7	7 56.8	9.642 4091	37640
4	300 6 16.2	3 11 26.8	7 16.1	6 41 27.9	6 52.8	9.638 5107	40325
5	303 19 35.4	3 15 14.5	+ 6 2.0	-6 47 46.7	- 5 44.0	9.634 3444	-43001
6	306 36 51.3	3 19 20.4	4 41.8	6 52 54.1	4 29.9	9.629 9111	45660
7	309 58 22.6	3 23 45.3	3 16.1	6 56 44.6	3 10.1	9.625 2134	48290
8	313 24 28.5	3 28 29.8	1 45.7	6 59 12.3	1 44.2	9.620 2545	50880
9	316 55 29.1	3 33 34.8	+ 0 11.6	7 0 10.8	- 0 11.7	9.615 0393	53415
10	320 31 45.1	3 39 0.8	- 1 25.1	-6 59 33.3	+ 1 28.0	9.609 5740	-55876
11	324 13 38.0	3 44 48.6	3 2.8	6 57 12.2	3 15.4	9.603 8674	58240
12	328 1 29.5	3 50 58.2	4 40.1	6 52 59.9	5 10.6	9.597 9300	60484
13	331 55 42.0	3 57 30.5	6 14.9	6 46 48.1	7 14.4	9.591 7759	62572
14	335 56 38.4	4 4 25.3	7 45.3	6 38 28.4	9 26.6	9.585 4220	64471
15	340 4 40.0	4 11 42.4	- 9 8.9	-6 27 52.1	+11 47.5	9.578 8895	-66138
16	344 20 10.2	4 19 21.5	10 23.1	6 14 50.6	14 17.0	9.572 2039	67520
17	348 43 30.0	4 27 21.6	11 25.4	5 59 15.4	16 54.6	9.565 3964	68573
18	353 14 59.7	4 35 41.0	12 12.8	5 40 58.9	19 39.6	9.558 5025	69231
19	357 54 57.7	4 44 17.8	12 42.6	5 19 54.2	22 30.8	9.551 5657	69423
20	2 43 39.9	4 53 8.8	-12 52.3	-4 55 55.9	+25 26.4	9.544 6356	-69084
21	7 41 18.8	5 2 10.4	12 39.5	4 29 0.9	28 23.8	9.537 7689	68142
22	12 48 2.8	5 11 18.0	12 2.5	3 59 8.5	31 20.5	9.531 0297	66522
23	18 3 54.7	5 20 25.3	11 0.4	3 26 21.5	34 12.4	9.524 4894	64155
24	23 28 51.0	5 29 25.4	9 33.1	2 50 47.0	36 54.8	9.518 2256	60982
25	29 2 40.5	5 38 10.3	- 7 42.1	-2 12 36.8	+39 22.8	9.512 3214	-56958
26	34 45 3.5	5 46 30.8	5 30.1	1 32 8.2	41 30.6	9.506 8634	52056
27	40 35 30.6	5 54 16.8	3 1.3	0 49 44.2	43 12.4	9.501 9395	46276
28	46 33 22.1	6 1 17.8	- 0 21.6	-0 5 53.8	44 22.6	9.497 6363	39654
29	52 37 47.6	6 7 23.1	+ 2 21.9	+0 38 48.8	44 56.0	9.494 0344	32262
30	58 47 46.3	6 12 22.5	+ 5 1.3	+1 23 44.5	+44 48.4	9.491 2061	-24205
Oct. 1	65 2 7.5	6 16 6.6	+ 7 28.3	+2 8 11.2	+43 57.6	9.489 2108	-15628

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Jan.	1	16 45	20.74	+13.167	-21	9	39.0	-29.55	0.154 0588	+610.2	5.99	6.17	22 4.3
	2	16 50	37.21	13.205	21	21	10.1	28.03	0.155 5154	603.7	5.98	6.15	22 5.7
	3	16 55	54.57	13.241	21	32	4.4	26.49	0.156 9568	597.4	5.96	6.13	22 7.0
	4	17 1	12.77	13.275	21	42	21.3	24.92	0.158 3831	591.2	5.94	6.11	22 8.4
	5	17 6	31.78	13.308	21	52	0.5	23.34	0.159 7944	585.0	5.92	6.09	22 9.8
	6	17 11	51.56	+13.340	-22	1	1.4	-21.73	0.161 1909	+578.8	5.90	6.07	22 11.2
	7	17 17	12.07	13.369	22	9	23.6	20.11	0.162 5726	572.7	5.88	6.05	22 12.6
	8	17 22	33.27	13.397	22	17	6.6	18.47	0.163 9398	566.6	5.86	6.03	22 14.0
	9	17 27	55.10	13.422	22	24	10.0	16.81	0.165 2925	560.6	5.84	6.01	22 15.5
	10	17 33	17.53	13.446	22	30	33.5	15.14	0.166 6308	554.6	5.82	5.99	22 16.9
	11	17 38	40.49	+13.467	-22	36	16.7	-13.46	0.167 9548	+548.7	5.81	5.98	22 18.3
	12	17 44	3.94	13.487	22	41	19.4	11.76	0.169 2645	542.7	5.79	5.96	22 19.8
	13	17 49	27.83	13.504	22	45	41.1	10.05	0.170 5600	536.8	5.77	5.94	22 21.3
	14	17 54	52.10	13.518	22	49	21.8	8.34	0.171 8413	530.9	5.75	5.92	22 22.7
	15	18 0	16.69	13.531	22	52	21.1	6.61	0.173 1085	525.0	5.74	5.91	22 24.2
	16	18 5	41.55	+13.541	-22	54	38.8	-4.87	0.174 3615	+519.1	5.73	5.89	22 25.7
	17	18 11	6.62	13.548	22	56	14.7	3.13	0.175 6004	513.3	5.71	5.87	22 27.2
	18	18 16	31.84	13.553	22	57	8.8	-1.38	0.176 8253	507.4	5.70	5.86	22 28.6
	19	18 21	57.14	13.555	22	57	21.0	+0.37	0.178 0361	501.6	5.68	5.84	22 30.1
	20	18 27	22.47	13.555	22	56	51.1	2.12	0.179 2330	495.8	5.66	5.82	22 31.6
	21	18 32	47.77	+13.553	-22	55	39.3	+3.87	0.180 4160	+490.0	5.65	5.81	22 33.1
	22	18 38	12.97	13.547	22	53	45.5	5.62	0.181 5851	484.3	5.63	5.79	22 34.5
	23	18 43	38.01	13.539	22	51	9.7	7.36	0.182 7406	478.6	5.62	5.78	22 36.0
	24	18 49	2.82	13.528	22	47	52.1	9.10	0.183 8824	472.9	5.60	5.76	22 37.5
	25	18 54	27.35	13.515	22	43	52.7	10.84	0.185 0108	467.4	5.59	5.75	22 39.0
	26	18 59	51.54	+13.500	-22	39	11.7	+12.57	0.186 1259	+461.9	5.57	5.73	22 40.4
	27	19 5	15.34	13.482	22	33	49.3	14.30	0.187 2279	456.4	5.56	5.72	22 41.9
	28	19 10	38.68	13.462	22	27	45.7	16.01	0.188 3169	451.1	5.54	5.70	22 43.3
	29	19 16	1.51	13.440	22	21	1.1	17.71	0.189 3932	445.8	5.53	5.69	22 44.7
	30	19 21	23.78	13.416	22	13	35.8	19.40	0.190 4569	440.6	5.52	5.68	22 46.1
Feb.	31	19 26	45.44	+13.389	-22	5	30.1	+21.07	0.191 5081	+435.4	5.50	5.66	22 47.6
	1	19 32	6.45	13.361	21	56	44.3	22.74	0.192 5470	430.3	5.49	5.65	22 49.0
	2	19 37	26.76	13.331	21	47	18.7	24.39	0.193 5737	425.2	5.47	5.63	22 50.4
	3	19 42	46.33	13.299	21	37	13.7	26.02	0.194 5882	420.2	5.46	5.62	22 51.7
	4	19 48	5.11	13.266	21	26	29.8	27.64	0.195 5907	415.2	5.45	5.61	22 53.1
	5	19 53	23.08	+13.231	-21	15	7.2	+29.24	0.196 5813	+410.2	5.44	5.60	22 54.4
	6	19 58	40.19	13.195	21	3	6.4	30.82	0.197 5599	405.3	5.42	5.58	22 55.8
	7	20 3	56.41	13.157	20	50	28.0	32.38	0.198 5267	400.4	5.41	5.57	22 57.1
	8	20 9	11.70	13.117	20	37	12.3	33.92	0.199 4818	395.5	5.40	5.56	22 58.4
	9	20 14	26.03	13.077	20	23	20.0	35.44	0.200 4250	390.6	5.39	5.55	22 59.6
	10	20 19	39.38	+13.035	-20	8	51.5	+36.93	0.201 3565	+385.7	5.38	5.53	23 0.9
	11	20 24	51.72	12.993	19	53	47.4	38.41	0.202 2762	380.8	5.37	5.52	23 2.2
	12	20 30	3.03	12.949	19	38	8.2	39.86	0.203 1842	375.9	5.36	5.51	23 3.4
	13	20 35	13.28	12.905	19	21	54.5	41.28	0.204 0804	371.0	5.35	5.50	23 4.6
	14	20 40	22.46	12.860	19	5	7.0	42.68	0.204 9648	366.1	5.34	5.49	23 5.8
	15	20 45	30.55	+12.814	-18	47	46.2	+44.05	0.205 8375	+361.2	5.33	5.48	23 7.0
	16	20 50	37.53	+12.768	-18	29	52.7	+45.40	0.206 6983	+356.2	5.32	5.47	23 8.1

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- ax.	Transit Meridian of Green- wich.		
	Noon.				Noon.										
	h	m	s	s	°	'	"	"					h	m	
Feb.	16	20	50	37.53	+12.768	-18	29	52.7	+45.40	0.206 6983	+356.2	5.32	5.47	23 8.1	
	17	20	55	43.40	12.721	18	11	27.2	46.72	0.207 5472	351.2	5.31	5.46	23 9.3	
	18	21	0	48.13	12.674	17	52	30.4	48.01	0.208 3841	346.2	5.30	5.45	23 10.4	
	19	21	5	51.73	12.626	17	33	3.0	49.27	0.209 2091	341.3	5.28	5.43	23 11.5	
	20	21	10	54.18	12.578	17	13	5.7	50.50	0.210 0222	336.3	5.27	5.42	23 12.6	
	21	21	15	55.48	+12.530	-16	52	39.1	+51.71	0.210 8233	+331.3	5.26	5.41	23 13.6	
	22	21	20	55.62	12.482	16	31	44.0	52.88	0.211 6126	326.4	5.25	5.40	23 14.7	
	23	21	25	54.60	12.434	16	10	21.1	54.02	0.212 3900	321.5	5.25	5.40	23 15.7	
	24	21	30	52.44	12.386	15	48	31.1	55.14	0.213 1558	316.6	5.24	5.39	23 16.7	
	25	21	35	49.12	12.338	15	26	14.8	56.22	0.213 9099	311.8	5.23	5.38	23 17.7	
	26	21	40	44.66	+12.291	-15	3	32.9	+57.27	0.214 6524	+307.0	5.22	5.37	23 18.6	
	27	21	45	39.07	12.244	14	40	26.1	58.29	0.215 3835	302.3	5.21	5.36	23 19.6	
	28	21	50	32.36	12.197	14	16	55.1	59.28	0.216 1033	297.6	5.20	5.35	23 20.5	
	Mar.	1	21	55	24.54	12.152	13	53	0.7	60.24	0.216 8118	292.9	5.19	5.34	23 21.4
		2	22	0	15.64	12.107	13	28	43.7	61.17	0.217 5091	288.2	5.18	5.33	23 22.3
	3	22	5	5.67	+12.063	-13	4	4.6	+62.08	0.218 1953	+283.6	5.17	5.32	23 23.2	
	4	22	9	54.65	12.019	12	39	4.3	62.94	0.218 8704	279.0	5.17	5.32	23 24.0	
	5	22	14	42.60	11.977	12	13	43.5	63.78	0.219 5344	274.4	5.16	5.31	23 24.9	
	6	22	19	29.56	11.936	11	48	2.9	64.59	0.220 1874	269.8	5.15	5.30	23 25.7	
	7	22	24	15.54	11.896	11	22	3.2	65.37	0.220 8294	265.2	5.14	5.29	23 26.5	
	8	22	29	0.57	+11.857	-10	55	45.3	+66.12	0.221 4604	+260.6	5.13	5.28	23 27.3	
	9	22	33	44.68	11.819	10	29	9.7	66.84	0.222 0804	256.0	5.13	5.28	23 28.1	
	10	22	38	27.90	11.783	10	2	17.3	67.53	0.222 6894	251.5	5.12	5.27	23 28.8	
	11	22	43	10.26	11.748	9	35	8.7	68.18	0.223 2874	246.9	5.11	5.26	23 29.6	
	12	22	47	51.80	11.714	9	7	44.8	68.81	0.223 8744	242.2	5.11	5.26	23 30.3	
	13	22	52	32.53	+11.681	-8	40	6.2	+69.41	0.224 4501	+237.6	5.10	5.25	23 31.1	
	14	22	57	12.51	11.650	8	12	13.6	69.97	0.225 0147	232.9	5.09	5.24	23 31.8	
	15	23	1	51.76	11.621	7	44	7.8	70.50	0.225 5680	228.2	5.08	5.23	23 32.5	
	16	23	6	30.32	11.593	7	15	49.6	71.01	0.226 1039	223.4	5.08	5.23	23 33.2	
	17	23	11	8.23	11.566	6	47	19.6	71.48	0.226 6403	218.6	5.07	5.22	23 33.9	
	18	23	15	45.51	+11.541	-6	18	38.6	+71.93	0.227 1592	+213.8	5.07	5.22	23 34.5	
	19	23	20	22.21	11.517	5	49	47.3	72.34	0.227 6665	208.9	5.06	5.21	23 35.2	
	20	23	24	58.36	11.495	5	20	46.5	72.72	0.228 1621	204.0	5.05	5.20	23 35.8	
	21	23	29	33.99	11.475	4	51	37.0	73.07	0.228 6458	199.1	5.05	5.20	23 36.5	
	22	23	34	9.15	11.456	4	22	19.4	73.39	0.229 1176	194.1	5.04	5.19	23 37.1	
	23	23	38	43.87	+11.438	-3	52	54.5	+73.68	0.229 5774	+189.1	5.04	5.19	23 37.7	
	24	23	43	18.18	11.421	3	23	23.1	73.93	0.230 0253	184.1	5.03	5.18	23 38.4	
	25	23	47	52.12	11.407	2	53	45.9	74.16	0.230 4613	179.2	5.03	5.18	23 39.0	
	26	23	52	25.74	11.395	2	24	3.6	74.36	0.230 8854	174.2	5.03	5.17	23 39.6	
	27	23	56	59.07	11.383	1	54	17.0	74.52	0.231 2977	169.3	5.02	5.17	23 40.2	
	28	0	1	32.14	+11.373	-1	24	26.7	+74.66	0.231 6981	+164.4	5.02	5.16	23 40.8	
	29	0	6	5.01	11.366	0	54	33.6	74.76	0.232 0867	159.5	5.02	5.16	23 41.4	
	30	0	10	37.71	11.360	-0	24	38.3	74.84	0.232 4635	154.6	5.01	5.15	23 42.0	
	31	0	15	10.28	11.355	+0	5	18.5	74.89	0.232 8286	149.7	5.01	5.15	23 42.6	
	Apr.	1	0	19	42.77	11.353	0	35	16.1	74.91	0.233 1819	144.7	5.00	5.14	23 43.2
		2	0	24	15.22	+11.352	+1	5	13.8	+74.80	0.233 5234	+139.9	5.00	5.14	23 43.8
		3	0	28	47.66	+11.352	+1	35	10.8	+74.35	0.233 8532	+135.0	5.00	5.14	23 44.4

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Apr.	1	0	19 42.77	+11.353	+ 0	35	16.1	+74.91	0.233 1819	+144.7	5.00	5.14	23 43.2
	2	0	24 15.22	11.352	1	5	13.8	74.89	0.233 5234	139.9	5.00	5.14	23 43.8
	3	0	28 47.66	11.352	1	35	10.8	74.85	0.233 8532	135.0	5.00	5.14	23 44.4
	4	0	33 20.15	11.355	2	5	6.5	74.78	0.234 1712	130.1	4.99	5.13	23 45.0
	5	0	37 52.73	11.360	2	35	0.2	74.68	0.234 4775	125.1	4.99	5.13	23 45.6
	6	0	42 25.44	+11.366	+ 3	4	51.1	+74.55	0.234 7719	+120.2	4.98	5.12	23 46.2
	7	0	46 58.31	11.374	3	34	38.5	74.39	0.235 0545	115.3	4.98	5.12	23 46.8
	8	0	51 31.40	11.384	4	4	21.8	74.21	0.235 3253	110.4	4.98	5.12	23 47.5
	9	0	56 4.75	11.395	4	34	0.3	73.99	0.235 5842	105.4	4.98	5.12	23 48.1
	10	1	0 38.39	11.409	5	3	33.2	73.74	0.235 8311	100.4	4.97	5.11	23 48.7
	11	1	5 12.38	+11.424	+ 5	32	59.7	+73.46	0.236 0659	+ 95.3	4.97	5.11	23 49.3
	12	1	9 46.76	11.441	6	2	19.3	73.16	0.236 2885	90.2	4.97	5.11	23 50.0
	13	1	14 21.56	11.459	6	31	31.2	72.82	0.236 4989	85.1	4.96	5.10	23 50.6
	14	1	18 56.82	11.479	7	0	34.6	72.45	0.236 6968	79.8	4.96	5.10	23 51.3
	15	1	23 32.59	11.501	7	29	28.8	72.06	0.236 8821	74.6	4.96	5.10	23 51.9
	16	1	28 8.90	+11.525	+ 7	58	13.1	+71.63	0.237 0547	+ 69.2	4.96	5.10	23 52.6
	17	1	32 45.79	11.550	8	26	46.8	71.17	0.237 2144	63.9	4.96	5.10	23 53.3
	18	1	37 23.30	11.576	8	55	9.1	70.68	0.237 3612	58.5	4.95	5.09	23 54.0
	19	1	42 1.45	11.604	9	23	19.3	70.16	0.237 4950	53.0	4.95	5.09	23 54.7
	20	1	46 40.29	11.633	9	51	16.6	69.61	0.237 6156	47.5	4.95	5.09	23 55.4
	21	1	51 19.84	+11.663	+10	19	0.3	+69.03	0.237 7229	+ 41.9	4.95	5.09	23 56.1
	22	1	56 0.14	11.695	10	46	29.6	68.41	0.237 8169	36.4	4.95	5.09	23 56.9
	23	2	0 41.22	11.728	11	13	43.8	67.77	0.237 8975	30.8	4.95	5.09	23 57.6
	24	2	5 23.10	11.762	11	40	42.1	67.09	0.237 9647	25.2	4.95	5.09	23 58.4
	25	2	10 5.82	11.797	12	7	23.8	66.38	0.238 0184	19.6	4.95	5.09	23 59.2
	26	2	14 49.39	+11.834	+12	33	48.1	+65.64	0.238 0586	+ 14.0	4.95	5.09	...
	27	2	19 33.86	11.872	12	59	54.3	64.87	0.238 0854	8.4	4.95	5.09	0 0.0
	28	2	24 19.24	11.910	13	25	41.7	64.07	0.238 0988	+ 2.8	4.95	5.09	0 0.8
	29	2	29 5.56	11.950	13	51	9.5	63.24	0.238 0987	- 2.9	4.95	5.09	0 1.6
	30	2	33 52.85	11.991	14	16	17.0	62.38	0.238 0851	8.5	4.95	5.09	0 2.5
May	1	2	38 41.12	+12.032	+14	41	3.4	+61.48	0.238 0580	- 14.1	4.95	5.09	0 3.3
	2	2	43 30.40	12.075	15	5	28.0	60.56	0.238 0175	19.7	4.95	5.09	0 4.2
	3	2	48 20.72	12.118	15	29	30.1	59.61	0.237 9634	25.4	4.95	5.09	0 5.1
	4	2	53 12.08	12.162	15	53	8.9	58.62	0.237 8958	31.0	4.95	5.09	0 6.0
	5	2	58 4.50	12.207	16	16	23.7	57.61	0.237 8146	36.6	4.95	5.09	0 6.9
	6	3	2 58.01	+12.252	+16	39	13.8	+56.56	0.237 7199	- 42.3	4.95	5.09	0 7.9
	7	3	7 52.60	12.298	17	1	38.5	55.49	0.237 6115	48.0	4.95	5.09	0 8.9
	8	3	12 48.31	12.344	17	23	37.0	54.38	0.237 4894	53.7	4.95	5.09	0 9.9
	9	3	17 45.13	12.391	17	45	8.6	53.25	0.237 3536	59.4	4.95	5.09	0 10.9
	10	3	22 43.08	12.438	18	6	12.6	52.08	0.237 2040	65.2	4.96	5.10	0 11.9
	11	3	27 42.17	+12.486	+18	26	48.3	+50.89	0.237 0404	- 71.1	4.96	5.10	0 12.9
	12	3	32 42.39	12.533	18	46	54.9	49.66	0.236 8628	76.9	4.96	5.10	0 14.0
	13	3	37 43.74	12.580	19	6	31.8	48.41	0.236 6710	82.9	4.96	5.10	0 15.1
	14	3	42 46.23	12.627	19	25	38.2	47.12	0.236 4649	88.9	4.96	5.10	0 16.2
	15	3	47 49.85	12.674	19	44	13.5	45.81	0.236 2444	94.9	4.97	5.11	0 17.3
	16	3	52 54.59	+12.721	+20	2	17.0	+44.47	0.236 0092	-101.1	4.97	5.11	0 18.4
	17	3	58 0.44	+12.767	+20	19	48.0	+43.10	0.235 7593	-107.2	4.97	5.11	0 19.6

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.	
	Noon.				Noon.									Noon.
	h	m	s	s	°	'	"	"					h	m
May	17	3	58	0.44	+12.767	+20	19	48.0	+43.10	0.235 7593	-107.2	4.97	5.11	0 19.6
	18	4	3	7.39	12.812	20	36	45.8	41.71	0.235 4945	113.4	4.98	5.12	0 20.8
	19	4	8	15.42	12.857	20	53	9.9	40.29	0.235 2148	119.7	4.98	5.12	0 22.0
	20	4	13	24.50	12.900	21	8	59.5	38.84	0.234 9200	126.0	4.98	5.12	0 23.2
	21	4	18	34.62	12.943	21	24	14.0	37.37	0.234 6100	132.3	4.99	5.13	0 24.4
	22	4	23	45.75	+12.984	+21	38	52.9	+35.87	0.234 2848	-138.7	4.99	5.13	0 25.6
	23	4	28	57.86	13.024	21	52	55.5	34.34	0.233 9443	145.1	4.99	5.13	0 26.9
	24	4	34	10.91	13.063	22	6	21.2	32.80	0.233 5885	151.4	5.00	5.14	0 28.1
	25	4	39	24.89	13.101	22	19	9.6	31.23	0.233 2174	157.8	5.00	5.14	0 29.4
	26	4	44	39.75	13.137	22	31	20.1	29.64	0.232 8310	164.2	5.01	5.15	0 30.7
	27	4	49	55.46	+13.171	+22	42	52.1	+28.03	0.232 4292	-170.6	5.01	5.15	0 32.1
	28	4	55	11.96	13.204	22	53	45.3	26.40	0.232 0120	177.0	5.02	5.16	0 33.4
June	29	5	0	29.23	13.235	23	3	59.1	24.75	0.231 5794	183.5	5.02	5.16	0 34.8
	30	5	5	47.23	13.264	23	13	33.1	23.08	0.231 1314	189.9	5.03	5.17	0 36.1
	31	5	11	5.90	13.291	23	22	27.0	21.40	0.230 6681	196.2	5.03	5.17	0 37.5
	1	5	16	25.20	+13.317	+23	30	40.2	+19.70	0.230 1894	-202.6	5.03	5.18	0 38.9
	2	5	21	45.08	13.340	23	38	12.4	17.99	0.229 6954	209.0	5.04	5.19	0 40.3
	3	5	27	5.49	13.361	23	45	3.4	16.26	0.229 1861	215.4	5.04	5.19	0 41.7
	4	5	32	26.37	13.380	23	51	12.7	14.52	0.228 6614	221.8	5.05	5.20	0 43.1
	5	5	37	47.69	13.396	23	56	40.2	12.77	0.228 1215	228.2	5.05	5.20	0 44.5
	6	5	43	9.38	+13.411	+24	1	25.5	+11.01	0.227 5662	-234.6	5.06	5.21	0 45.9
	7	5	48	31.39	13.423	24	5	28.5	9.24	0.226 9956	241.0	5.07	5.22	0 47.3
	8	5	53	53.67	13.433	24	8	48.9	7.46	0.226 4095	247.5	5.07	5.22	0 48.8
	9	5	59	16.15	13.440	24	11	26.5	5.68	0.225 8078	253.9	5.08	5.23	0 50.2
	10	6	4	38.79	13.446	24	13	21.3	3.89	0.225 1906	260.4	5.09	5.24	0 51.6
	11	6	10	1.52	+13.448	+24	14	33.1	+ 2.09	0.224 5576	-267.0	5.10	5.25	0 53.1
	12	6	15	24.29	13.449	24	15	1.8	+ 0.30	0.223 9088	273.6	5.10	5.25	0 54.5
	13	6	20	47.03	13.446	24	14	47.4	- 1.50	0.223 2441	280.3	5.11	5.26	0 55.9
	14	6	26	9.68	13.441	24	13	49.9	3.29	0.222 5633	287.0	5.12	5.27	0 57.4
	15	6	31	32.18	13.433	24	12	9.3	5.09	0.221 8664	293.8	5.13	5.28	0 58.8
	16	6	36	54.46	+13.423	+24	9	45.7	- 6.88	0.221 1531	-300.6	5.14	5.29	1 0.2
	17	6	42	16.47	13.410	24	6	39.1	8.67	0.220 4235	307.4	5.15	5.30	1 1.7
18	6	47	38.14	13.395	24	2	49.7	10.45	0.219 6775	314.3	5.16	5.31	1 3.1	
19	6	52	59.42	13.378	23	58	17.6	12.22	0.218 9148	321.2	5.16	5.31	1 4.5	
20	6	58	20.25	13.357	23	53	3.1	13.99	0.218 1355	328.2	5.17	5.32	1 5.9	
21	7	3	40.56	+13.335	+23	47	6.2	-15.75	0.217 3395	-335.1	5.18	5.33	1 7.3	
22	7	9	0.30	13.310	23	40	27.4	17.49	0.216 5268	342.1	5.19	5.34	1 8.7	
23	7	14	19.40	13.282	23	33	6.8	19.22	0.215 6975	349.0	5.21	5.36	1 10.1	
24	7	19	37.81	13.252	23	25	4.8	20.94	0.214 8515	356.0	5.22	5.37	1 11.4	
25	7	24	55.49	13.220	23	16	21.7	22.64	0.213 9888	362.9	5.23	5.38	1 12.8	
26	7	30	12.37	+13.186	+23	6	58.0	-24.33	0.213 1094	-369.9	5.24	5.39	1 14.1	
27	7	35	28.42	13.151	22	56	53.9	26.01	0.212 2132	376.9	5.25	5.40	1 15.5	
28	7	40	43.58	13.113	22	46	9.9	27.66	0.211 3003	383.8	5.26	5.41	1 16.8	
29	7	45	57.82	13.073	22	34	46.5	29.29	0.210 3709	390.7	5.27	5.42	1 18.1	
30	7	51	11.08	13.032	22	22	44.0	30.91	0.209 4248	397.6	5.28	5.43	1 19.3	
July	1	7	56	23.34	+12.989	+22	10	3.0	-32.51	0.208 4622	-404.5	5.29	5.44	1 20.6
	2	8	1	34.55	+12.945	+21	56	43.9	-34.08	0.207 4831	-411.4	5.31	5.46	1 21.8



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
July	1	7 56	23.34	+12.989	+22 10	3.0		-32.51	0.208 4622	-404.5	5.29	5.44	1 20.6
	2	8 1	34.55	12.945	21 56	43.9		34.08	0.207 4831	411.4	5.31	5.46	1 21.8
	3	8 6	44.69	12.900	21 42	47.3		35.63	0.206 4876	418.2	5.32	5.47	1 23.1
	4	8 11	53.73	12.853	21 28	13.7		37.16	0.205 4756	425.1	5.33	5.48	1 24.3
	5	8 17	1.64	12.806	21 13	3.7		38.67	0.204 4473	431.9	5.35	5.50	1 25.5
	6	8 22	8.40	+12.757	+20 57	17.7		-40.16	0.203 4027	-438.7	5.36	5.51	1 26.6
	7	8 27	13.99	12.708	20 40	56.4		41.61	0.202 3416	445.5	5.37	5.52	1 27.8
	8	8 32	18.38	12.658	20 24	0.4		43.05	0.201 2641	452.4	5.38	5.54	1 28.9
	9	8 37	21.56	12.607	20 6	30.2		44.46	0.200 1701	459.3	5.39	5.55	1 30.0
	10	8 42	23.53	12.556	19 48	26.6		45.84	0.199 0595	466.2	5.40	5.56	1 31.1
	11	8 47	24.26	+12.504	+19 29	50.0		-47.20	0.197 9323	-473.2	5.42	5.58	1 32.2
	12	8 52	23.74	12.453	19 10	41.3		48.53	0.196 7883	480.2	5.43	5.59	1 33.2
	13	8 57	21.98	12.401	18 51	1.0		49.83	0.195 6275	487.2	5.45	5.61	1 34.3
	14	9 2	18.96	12.348	18 30	49.8		51.10	0.194 4497	494.3	5.46	5.62	1 35.3
	15	9 7	14.67	12.295	18 10	8.4		52.34	0.193 2548	501.4	5.48	5.64	1 36.2
	16	9 12	9.13	+12.243	+17 48	57.5		-53.56	0.192 0428	-508.6	5.49	5.65	1 37.2
	17	9 17	2.32	12.190	17 27	17.8		54.74	0.190 8135	515.8	5.51	5.67	1 38.1
	18	9 21	54.25	12.137	17 5	10.0		55.90	0.189 5669	523.0	5.53	5.69	1 39.1
	19	9 26	44.92	12.085	16 42	34.8		57.03	0.188 3029	530.3	5.54	5.70	1 40.0
	20	9 31	34.33	12.033	16 19	33.0		58.12	0.187 0215	537.5	5.56	5.72	1 40.9
	21	9 36	22.50	+11.981	+15 56	5.3		-59.19	0.185 7227	-544.8	5.58	5.74	1 41.7
	22	9 41	9.44	11.930	15 32	12.3		60.22	0.184 4064	552.1	5.59	5.75	1 42.6
	23	9 45	55.15	11.879	15 7	54.9		61.22	0.183 0726	559.4	5.61	5.77	1 43.4
	24	9 50	39.66	11.830	14 43	13.8		62.20	0.181 7213	566.7	5.63	5.79	1 44.2
	25	9 55	22.97	11.780	14 18	9.7		63.14	0.180 3525	574.0	5.65	5.81	1 44.9
	26	10 0	5.09	+11.731	+13 52	43.4		-64.05	0.178 9662	-581.3	5.67	5.83	1 45.7
	27	10 4	46.06	11.683	13 26	55.6		64.93	0.177 5624	588.5	5.69	5.85	1 46.4
	28	10 9	25.89	11.636	13 0	47.0		65.78	0.176 1412	595.8	5.71	5.87	1 47.2
	29	10 14	4.60	11.590	12 34	18.4		66.60	0.174 7025	603.1	5.72	5.88	1 47.9
	30	10 18	42.22	11.545	12 7	30.4		67.39	0.173 2464	610.3	5.73	5.90	1 48.5
	31	10 23	18.77	+11.501	+11 40	23.9		-68.15	0.171 7730	-617.5	5.75	5.92	1 49.2
Aug.	1	10 27	54.28	11.458	11 12	59.5		68.88	0.170 2825	624.6	5.78	5.95	1 49.9
	2	10 32	28.78	11.417	10 45	17.9		69.58	0.168 7748	631.8	5.80	5.97	1 50.5
	3	10 37	2.30	11.377	10 17	19.9		70.25	0.167 2500	638.9	5.82	5.99	1 51.1
	4	10 41	34.87	11.338	9 49	6.2		70.89	0.165 7081	646.0	5.84	6.01	1 51.7
	5	10 46	6.54	+11.301	+ 9 20	37.4		-71.51	0.164 1491	-653.1	5.86	6.03	1 52.3
	6	10 50	37.33	11.265	8 51	54.2		72.09	0.162 5730	660.3	5.88	6.05	1 52.9
	7	10 55	7.29	11.231	8 22	57.3		72.64	0.160 9798	667.5	5.90	6.07	1 53.4
	8	10 59	36.44	11.198	7 53	47.5		73.17	0.159 3692	674.7	5.93	6.10	1 54.0
	9	11 4	4.83	11.167	7 24	25.4		73.67	0.157 7413	682.0	5.95	6.12	1 54.5
	10	11 8	32.49	+11.138	+ 6 54	51.7		-74.14	0.156 0958	-689.3	5.97	6.14	1 55.0
	11	11 12	59.46	11.110	6 25	7.1		74.57	0.154 4326	696.7	6.00	6.17	1 55.5
	12	11 17	25.78	11.083	5 55	12.4		74.98	0.152 7517	704.1	6.02	6.19	1 56.0
	13	11 21	51.48	11.059	5 25	8.2		75.36	0.151 0530	711.5	6.04	6.21	1 56.5
	14	11 26	16.61	11.036	4 54	55.2		75.72	0.149 3363	719.0	6.07	6.24	1 57.0
	15	11 30	41.20	+11.014	+ 4 24	34.1		-76.03	0.147 6015	-726.6	6.08	6.26	1 57.4
	16	11 35	5.28	+10.993	+ 3 54	5.8		-76.32	0.145 8484	-734.2	6.11	6.29	1 57.9



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
ig. 16	11	35	5.28	+10.993	+	3	54 5.8	-76.32	0.145 8484	- 784.2	6.11	6.29	1 57.9
17	11	39	28.90	10.975		3	23 30.8	76.59	0.144 0771	741.9	6.14	6.32	1 58.4
18	11	43	52.09	10.958		2	52 49.9	76.82	0.142 2874	749.6	6.16	6.34	1 58.8
19	11	48	14.90	10.943		2	22 3.8	77.02	0.140 4791	757.3	6.19	6.37	1 59.2
20	11	52	37.36	10.929		1	51 13.2	77.19	0.138 6522	765.1	6.21	6.39	1 59.7
21	11	56	59.51	+10.917	+	1	20 18.8	-77.34	0.136 8066	- 772.9	6.24	6.42	2 0.1
22	12	1	21.38	10.906		0	49 21.3	77.45	0.134 9422	780.8	6.27	6.45	2 0.5
23	12	5	43.02	10.897	+	0	18 21.3	77.54	0.133 0589	788.6	6.30	6.48	2 0.9
24	12	10	4.47	10.890	-	0	12 40.4	77.59	0.131 1568	796.5	6.33	6.51	2 1.3
25	12	14	25.76	10.884		0	43 43.0	77.62	0.129 2357	804.4	6.35	6.53	2 1.8
26	12	18	46.93	+10.880	-	1	14 46.0	-77.62	0.127 2957	- 812.2	6.38	6.56	2 2.2
27	12	23	8.03	10.878		1	45 48.6	77.59	0.125 3369	820.1	6.41	6.59	2 2.6
28	12	27	29.08	10.877		2	16 50.1	77.53	0.123 3591	828.0	6.43	6.62	2 3.0
29	12	31	50.13	10.878		2	47 49.8	77.44	0.121 3625	835.9	6.46	6.65	2 3.4
30	12	36	11.22	10.880		3	18 47.1	77.33	0.119 3469	843.7	6.49	6.68	2 3.8
31	12	40	32.39	+10.884	-	3	49 41.3	-77.18	0.117 3125	- 851.6	6.53	6.72	2 4.2
pt. 1	12	44	53.08	10.890		4	20 31.7	77.01	0.115 2591	859.5	6.56	6.75	2 4.6
2	12	49	15.14	10.898		4	51 17.6	76.81	0.113 1869	867.4	6.59	6.78	2 5.0
3	12	53	36.81	10.908		5	21 58.4	76.58	0.111 0957	875.3	6.62	6.81	2 5.5
4	12	57	58.72	10.919		5	52 33.4	76.33	0.108 9856	883.2	6.66	6.85	2 5.9
5	13	2	20.93	+10.932	-	6	23 2.0	-76.06	0.106 8562	- 891.2	6.69	6.88	2 6.3
6	13	6	43.46	10.946		6	53 23.5	76.74	0.104 7077	899.2	6.72	6.91	2 6.7
7	13	11	6.37	10.963		7	23 37.2	76.40	0.102 5398	907.4	6.76	6.95	2 7.2
8	13	15	29.70	10.981		7	53 42.3	76.03	0.100 3522	915.6	6.78	6.98	2 7.6
9	13	19	53.47	11.000		8	23 38.2	74.63	0.098 1448	923.9	6.82	7.02	2 8.1
10	13	24	17.73	+11.022	-	8	53 24.2	-74.20	0.095 9174	- 932.3	6.85	7.05	2 8.6
11	13	28	42.52	11.044		9	22 59.6	73.74	0.093 6697	940.8	6.89	7.09	2 9.0
12	13	33	7.87	11.068		9	52 23.7	73.26	0.091 4016	949.4	6.93	7.13	2 9.5
13	13	37	33.81	11.093		10	21 35.7	72.74	0.089 1129	958.0	6.97	7.17	2 10.0
14	13	42	0.37	11.120		10	50 34.9	72.19	0.086 8032	966.7	7.00	7.20	2 10.5
15	13	46	27.00	+11.149	-	11	19 20.7	-71.62	0.084 4725	- 975.6	7.04	7.24	2 11.0
16	13	50	55.52	11.178		11	47 52.4	71.01	0.082 1204	984.5	7.08	7.28	2 11.5
17	13	55	24.15	11.208		12	16 9.1	70.37	0.079 7468	993.5	7.12	7.32	2 12.1
18	13	59	53.52	11.240		12	44 10.1	69.71	0.077 3514	1002.7	7.15	7.36	2 12.6
19	14	4	23.66	11.272		13	11 54.8	69.01	0.074 9339	1011.9	7.19	7.40	2 13.2
20	14	8	54.59	+11.306	-	13	39 22.3	-68.28	0.072 4943	-1021.2	7.24	7.45	2 13.7
21	14	13	26.34	11.340		14	6 31.9	67.52	0.070 0322	1030.6	7.28	7.49	2 14.3
22	14	17	58.92	11.375		14	33 23.0	66.73	0.067 5476	1040.0	7.32	7.53	2 14.9
23	14	22	32.36	11.411		14	59 54.8	65.91	0.065 0403	1049.4	7.37	7.58	2 15.6
24	14	27	6.67	11.448		15	26 6.6	65.06	0.062 5102	1059.0	7.41	7.62	2 16.2
25	14	31	41.87	+11.485	-	15	51 57.6	-64.18	0.059 9570	-1068.7	7.45	7.67	2 16.8
26	14	36	17.97	11.523		16	17 27.1	63.27	0.057 3806	1078.4	7.49	7.71	2 17.5
27	14	40	54.99	11.562		16	42 34.4	62.33	0.054 7809	1088.1	7.54	7.76	2 18.2
28	14	45	32.95	11.601		17	7 18.8	61.36	0.052 1579	1097.8	7.58	7.80	2 18.9
29	14	50	11.84	11.640		17	31 39.5	60.36	0.049 5116	1107.5	7.63	7.85	2 19.6
30	14	54	51.69	+11.680	-	17	55 35.9	-59.33	0.046 8417	-1117.3	7.68	7.90	2 20.3
ct. 1	14	59	32.50	+11.721	-	18	19 7.3	-58.28	0.044 1483	-1127.2	7.73	7.95	2 21.0

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.		
	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.							Noon.	Noon.
	h	m	s	s	°	'	"	"	Noon.	Noon.	"	"	h	m	
Oct.	1	14	59	32.50	+11.721	-18	19	7.3	-58.28	0.044 1483	-1127.2	7.73	7.95	2	21.0
	2	15	4	14.29	11.761	18	42	13.0	57.19	0.041 4312	1137.1	7.78	8.00	2	21.8
	3	15	8	57.05	11.802	19	4	52.2	56.08	0.038 6900	1147.2	7.82	8.05	2	22.5
	4	15	13	40.80	11.844	19	27	4.4	54.93	0.035 9247	1157.3	7.87	8.10	2	23.3
	5	15	18	25.54	11.885	19	48	48.8	53.76	0.033 1349	1167.5	7.92	8.15	2	24.2
	6	15	23	11.26	+11.926	-20	10	4.8	-52.56	0.030 3204	-1177.9	7.98	8.21	2	25.0
	7	15	27	57.97	11.967	20	30	51.5	51.33	0.027 4808	1188.4	8.03	8.26	2	25.8
	8	15	32	45.66	12.007	20	51	8.5	50.08	0.024 6158	1199.1	8.08	8.31	2	26.7
	9	15	37	34.32	12.048	21	10	55.0	48.80	0.021 7251	1209.9	8.14	8.37	2	27.5
	10	15	42	23.94	12.087	21	30	10.5	47.49	0.018 8082	1220.9	8.19	8.43	2	28.4
	11	15	47	14.51	+12.126	-21	48	54.1	-46.15	0.015 8648	-1232.0	8.24	8.48	2	29.3
	12	15	52	5.99	12.164	22	7	5.3	44.79	0.012 8944	1243.3	8.30	8.54	2	30.2
	13	15	56	58.37	12.201	22	24	43.5	43.40	0.009 8966	1254.8	8.36	8.60	2	31.2
	14	16	1	51.62	12.237	22	41	48.1	41.98	0.006 8710	1266.5	8.42	8.66	2	32.1
	15	16	6	45.72	12.271	22	58	18.3	40.54	0.003 8171	1278.4	8.48	8.72	2	33.1
	16	16	11	40.62	+12.304	-23	14	13.8	-39.08	0.000 7347	-1290.3	8.53	8.78	2	34.1
	17	16	16	36.31	12.336	23	29	33.9	37.59	9.997 6233	1302.5	8.60	8.85	2	35.1
	18	16	21	32.72	12.365	23	44	18.0	36.08	9.994 4824	1314.9	8.66	8.91	2	36.1
	19	16	26	29.83	12.393	23	58	25.6	34.55	9.991 3116	1327.5	8.73	8.98	2	37.1
	20	16	31	27.57	12.418	24	11	56.2	33.00	9.988 1104	1340.2	8.79	9.04	2	38.1
	21	16	36	25.90	+12.442	-24	24	49.4	-31.43	9.984 8785	-1353.1	8.85	9.11	2	39.1
	22	16	41	24.76	12.463	24	37	4.7	29.84	9.981 6155	1366.1	8.92	9.18	2	40.2
	23	16	46	24.09	12.481	24	48	41.7	28.24	9.978 3210	1379.3	8.99	9.25	2	41.2
	24	16	51	23.83	12.497	24	59	39.9	26.61	9.974 9948	1392.6	9.06	9.32	2	42.2
	25	16	56	23.93	12.511	25	9	59.0	24.97	9.971 6364	1406.1	9.13	9.39	2	43.3
	26	17	1	24.33	+12.522	-25	19	38.6	-23.32	9.968 2456	-1419.6	9.20	9.47	2	44.4
	27	17	6	24.95	12.530	25	28	38.5	21.66	9.964 8221	1433.3	9.27	9.54	2	45.4
	28	17	11	25.73	12.535	25	36	58.3	19.99	9.961 3658	1447.0	9.35	9.62	2	46.5
	29	17	16	26.60	12.537	25	44	37.8	18.30	9.957 8763	1460.9	9.43	9.70	2	47.6
	30	17	21	27.49	12.537	25	51	36.7	16.61	9.954 3532	1475.0	9.51	9.78	2	48.7
31	17	26	28.34	+12.533	-25	57	54.9	-14.91	9.950 7963	-1489.2	9.58	9.86	2	49.7	
Nov.	1	17	31	29.06	12.527	26	3	32.1	13.20	9.947 2051	1503.5	9.66	9.94	2	50.8
	2	17	36	29.60	12.517	26	8	28.3	11.48	9.943 5793	1518.0	9.74	10.02	2	51.9
	3	17	41	29.87	12.505	26	12	43.3	9.76	9.939 9183	1532.8	9.83	10.11	2	52.9
	4	17	46	29.80	12.489	26	16	17.0	8.04	9.936 2217	1547.7	9.90	10.19	2	54.0
	5	17	51	29.31	+12.470	-26	19	9.3	-6.32	9.932 4890	-1562.9	9.99	10.28	2	55.0
	6	17	56	28.33	12.448	26	21	20.4	4.60	9.928 7195	1578.4	10.08	10.37	2	56.1
	7	18	1	26.78	12.422	26	22	50.2	2.88	9.924 9127	1594.0	10.17	10.46	2	57.1
	8	18	6	24.58	12.393	26	23	38.7	-1.16	9.921 0680	1609.9	10.25	10.55	2	58.1
	9	18	11	21.63	12.361	26	23	46.1	+0.55	9.917 1847	1626.2	10.35	10.65	2	59.1
	10	18	16	17.86	+12.325	-26	23	12.5	+2.25	9.913 2622	-1642.7	10.45	10.75	3	0.1
	11	18	21	13.18	12.285	26	21	58.1	3.95	9.909 2997	1659.5	10.54	10.84	3	1.1
	12	18	26	7.50	12.241	26	20	3.0	5.64	9.905 2965	1676.6	10.63	10.94	3	2.1
	13	18	31	0.74	12.195	26	17	27.5	7.32	9.901 2520	1693.9	10.74	11.05	3	3.0
	14	18	35	52.81	12.144	26	14	11.9	8.98	9.897 1655	1711.5	10.84	11.15	3	3.9
	15	18	40	43.61	+12.089	-26	10	16.4	+10.63	9.893 0363	-1729.6	10.94	11.26	3	4.8
	16	18	45	33.07	+12.031	-26	5	41.6	+12.27	9.888 8634	-1747.9	11.05	11.37	3	5.7

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.				Noon.								
	h	m	s	s	°	'	"	"					h m
Nov. 16	18	45	33.07	+12.031	-26	5	41.6	+12.27	9.888 8634	-1747.9	11.05	11.37	3 5.7
17	18	50	21.07	11.969	26	0	27.6	13.89	9.884 6463	1766.5	11.16	11.48	3 6.6
18	18	55	7.54	11.903	25	54	35.0	15.49	9.880 3841	1785.4	11.27	11.59	3 7.4
19	18	59	52.39	11.833	25	48	4.3	17.07	9.876 0762	1804.6	11.38	11.71	3 8.2
20	19	4	35.51	11.760	25	40	55.9	18.63	9.871 7219	1824.0	11.49	11.82	3 9.0
21	19	9	16.82	+11.682	-25	33	10.4	+20.16	9.867 3207	-1843.7	11.61	11.94	3 9.7
22	19	13	56.23	11.601	25	24	48.3	21.67	9.862 8718	1863.7	11.73	12.07	3 10.4
23	19	18	33.64	11.516	25	15	50.3	23.16	9.858 3748	1883.8	11.85	12.19	3 11.1
24	19	23	8.97	11.428	25	6	16.9	24.62	9.853 8292	1904.2	11.98	12.32	3 11.7
25	19	27	42.14	11.336	24	56	8.8	26.06	9.849 2344	1924.8	12.10	12.45	3 12.3
26	19	32	13.06	+11.240	-24	45	26.6	+27.46	9.844 5900	-1945.6	12.24	12.59	3 12.9
27	19	36	41.64	11.141	24	34	11.0	28.84	9.839 8955	1966.5	12.36	12.72	3 13.4
28	19	41	7.82	11.040	24	22	22.7	30.18	9.835 1504	1987.7	12.50	12.86	3 13.9
29	19	45	31.52	10.935	24	10	2.5	31.50	9.830 3542	2009.1	12.65	13.01	3 14.4
30	19	49	52.65	10.826	23	57	11.0	32.79	9.825 5064	2030.7	12.78	13.15	3 14.8
Dec. 1	19	54	11.15	+10.715	-23	43	49.1	+34.04	9.820 6064	-2052.6	12.93	13.30	3 15.1
2	19	58	26.94	10.601	23	29	57.5	35.26	9.815 6536	2074.7	13.07	13.45	3 15.4
3	20	2	39.95	10.483	23	15	37.0	36.44	9.810 6474	2097.1	13.23	13.61	3 15.7
4	20	6	50.11	10.363	23	0	48.5	37.60	9.805 5871	2119.8	13.38	13.77	3 16.0
5	20	10	57.34	10.239	22	45	32.7	38.71	9.800 4721	2142.8	13.54	13.93	3 16.1
6	20	15	1.57	+10.113	-22	29	50.7	+39.79	9.795 3015	-2166.1	13.71	14.10	3 16.2
7	20	19	2.72	9.983	22	13	43.2	40.83	9.790 0748	2189.6	13.87	14.27	3 16.3
8	20	23	0.72	9.850	21	57	11.1	41.84	9.784 7912	2213.4	14.04	14.44	3 16.3
9	20	26	55.50	9.714	21	40	15.4	42.80	9.779 4500	2237.6	14.21	14.62	3 16.3
10	20	30	46.96	9.574	21	22	57.0	43.73	9.774 0504	2262.1	14.40	14.81	3 16.2
11	20	34	35.03	+ 9.431	-21	5	16.9	+44.61	9.768 5918	-2286.8	14.57	14.99	3 16.0
12	20	38	19.63	9.285	20	47	16.1	45.45	9.763 0735	2311.8	14.75	15.18	3 15.8
13	20	42	0.68	9.135	20	28	55.6	46.25	9.757 4948	2337.2	14.95	15.38	3 15.6
14	20	45	38.08	8.981	20	10	16.5	47.00	9.751 8549	2362.8	15.14	15.58	3 15.3
15	20	49	11.73	8.823	19	51	19.8	47.71	9.746 1534	2388.6	15.35	15.79	3 14.9
16	20	52	41.55	+ 8.661	-19	32	6.6	+48.37	9.740 3896	-2414.6	15.55	16.00	3 14.4
17	20	56	7.42	8.495	19	12	38.2	48.99	9.734 5632	2440.8	15.77	16.22	3 13.9
18	20	59	29.25	8.324	18	52	55.6	49.55	9.728 6738	2467.0	15.98	16.44	3 13.3
19	21	2	46.91	8.148	18	33	0.0	50.07	9.722 7214	2493.3	16.19	16.66	3 12.6
20	21	6	0.30	7.967	18	12	52.7	50.53	9.716 7059	2519.6	16.43	16.90	3 11.9
21	21	9	9.29	+ 7.781	-17	52	34.8	+50.95	9.710 6274	-2545.7	16.65	17.13	3 11.1
22	21	12	13.76	7.591	17	32	7.6	51.31	9.704 4865	2571.7	16.89	17.38	3 10.2
23	21	15	13.60	7.395	17	11	32.3	51.62	9.698 2835	2597.4	17.14	17.63	3 9.3
24	21	18	8.67	7.193	16	50	50.2	51.88	9.692 0193	2622.7	17.38	17.88	3 8.2
25	21	20	58.83	6.986	16	30	2.7	52.08	9.685 6947	2647.7	17.64	18.15	3 7.1
26	21	23	43.97	+ 6.774	-16	9	10.9	+52.23	9.679 3109	-2672.1	17.90	18.42	3 5.9
27	21	26	23.93	6.555	15	48	16.2	52.32	9.672 8692	2695.9	18.17	18.69	3 4.6
28	21	28	58.58	6.331	15	27	20.0	52.36	9.666 3713	2719.0	18.44	18.97	3 3.3
29	21	31	27.77	6.100	15	6	23.6	52.34	9.659 8186	2741.4	18.72	19.26	3 1.8
30	21	33	51.35	5.864	14	45	28.3	52.26	9.653 2132	2762.9	19.01	19.56	3 0.2
31	21	36	9.17	+ 5.620	-14	24	35.7	+52.12	9.646 5573	-2783.5	19.30	19.86	2 58.6
32	21	38	21.07	+ 5.370	-14	3	47.1	+51.92	9.639 8535	-2802.8	19.61	20.17	2 56.8

## FOR GREENWICH MEAN NOON.

Date.		Helio-centric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Helio-centric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	° ' "	' "	° ' "	' "		
Jan.	1	213 3 29.8	1 36 18.1	-3 0.5	+2 18 38.2	-4 10.7	9.858 9181	+821
	3	216 16 0.5	1 36 12.6	2 57.9	2 10 4.2	4 23.1	9.859 0828	826
	5	219 28 20.1	1 36 7.0	2 53.1	2 1 6.2	4 34.7	9.859 2482	828
	7	222 40 28.7	1 36 1.6	2 46.1	1 51 45.9	4 45.4	9.859 4138	827
	9	225 52 26.6	1 35 56.2	2 37.0	1 42 5.2	4 55.2	9.859 5790	824
	11	229 4 13.7	1 35 50.9	-2 26.0	+1 32 5.8	-5 4.0	9.859 7434	+819
	13	232 15 50.4	1 35 45.8	2 13.2	1 21 49.8	5 11.9	9.859 9063	810
	15	235 27 16.9	1 35 40.7	1 58.7	1 11 18.9	5 18.8	9.860 0673	800
	17	238 38 33.3	1 35 35.8	1 42.8	1 0 35.3	5 24.7	9.860 2260	787
	19	241 49 40.2	1 35 31.1	1 25.6	0 49 40.9	5 29.6	9.860 3818	771
	21	245 0 38.0	1 35 26.6	-1 7.4	+0 38 37.7	-5 33.4	9.860 5342	+753
	23	248 11 26.9	1 35 22.4	0 48.4	0 27 27.9	5 36.2	9.860 6828	733
	25	251 22 7.6	1 35 18.3	0 28.8	0 16 13.5	5 38.0	9.860 8271	710
	27	254 32 40.4	1 35 14.5	-0 8.8	+0 4 56.5	5 38.8	9.860 9667	686
	29	257 43 5.8	1 35 11.0	+0 11.3	-0 6 20.9	5 38.5	9.861 1012	659
	31	260 53 24.5	1 35 7.8	+0 31.2	-0 17 36.8	-5 37.2	9.861 2302	+631
Feb.	2	264 3 37.0	1 35 4.8	0 50.7	0 28 49.1	5 34.9	9.861 3583	600
	4	267 13 43.7	1 35 2.1	1 9.6	0 39 55.7	5 31.5	9.861 4700	567
	6	270 23 45.4	1 34 59.7	1 27.6	0 50 54.6	5 27.2	9.861 5801	533
	8	273 33 42.5	1 34 57.5	1 44.6	1 1 43.8	5 21.9	9.861 6832	498
	10	276 43 35.7	1 34 55.7	+2 0.2	-1 12 21.5	-5 15.6	9.861 7790	+460
	12	279 53 25.6	1 34 54.2	2 14.4	1 22 45.7	5 8.4	9.861 8671	422
	14	283 3 12.6	1 34 52.9	2 27.0	1 32 54.6	5 0.3	9.861 9476	382
	16	286 12 57.4	1 34 52.0	2 37.7	1 42 46.2	4 51.2	9.862 0199	341
	18	289 22 40.6	1 34 51.3	2 46.6	1 52 18.9	4 41.3	9.862 0840	299
	20	292 32 22.6	1 34 50.8	+2 53.4	-2 1 30.9	-4 30.6	9.862 1396	+256
	22	295 42 4.1	1 34 50.7	2 58.1	2 10 20.7	4 19.0	9.862 1865	213
	24	298 51 45.5	1 34 50.8	3 0.6	2 18 46.5	4 6.7	9.862 2246	168
	26	302 1 27.4	1 34 51.1	3 0.9	2 26 47.0	3 53.6	9.862 2538	124
	28	305 11 10.1	1 34 51.7	2 59.0	2 34 20.6	3 39.9	9.862 2741	79
Mar.	2	308 20 54.2	1 34 52.5	+2 55.0	-2 41 26.0	-3 25.5	9.862 2853	+ 33
	4	311 30 40.1	1 34 53.4	2 48.8	2 48 2.0	3 10.4	9.862 2874	- 12
	6	314 40 28.1	1 34 54.6	2 40.5	2 54 7.3	2 54.8	9.862 2805	57
	8	317 50 18.7	1 34 56.0	2 30.3	2 59 40.8	2 38.7	9.862 2645	103
	10	321 0 12.3	1 34 57.5	2 18.3	3 4 41.6	2 22.0	9.862 2395	147
	12	324 10 9.0	1 34 59.2	+2 4.6	-3 9 8.6	-2 4.9	9.862 2056	-192
	14	327 20 9.3	1 35 1.1	1 49.4	3 13 1.1	1 47.5	9.862 1628	236
	16	330 30 13.4	1 35 3.1	1 32.8	3 16 18.3	1 29.7	9.862 1112	279
	18	333 40 21.6	1 35 5.2	1 15.1	3 18 59.7	1 11.6	9.862 0511	321
	20	336 50 34.1	1 35 7.4	0 56.4	3 21 4.6	0 53.3	9.861 9827	363
	22	340 0 51.1	1 35 9.6	+0 37.1	-3 22 32.8	-0 34.8	9.861 9061	-403
	24	343 11 12.7	1 35 12.0	+0 17.3	3 23 23.8	-0 16.2	9.861 8215	442
	26	346 21 39.2	1 35 14.5	-0 2.7	3 23 37.5	+0 2.5	9.861 7292	481
	28	349 32 10.8	1 35 17.1	0 22.7	3 23 13.8	0 21.2	9.861 6294	517
	30	352 42 47.5	1 35 19.7	0 42.4	3 22 12.7	0 39.9	9.861 5226	551
Apr.	1	355 53 29.5	1 35 22.4	-1 1.6	-3 20 34.3	+0 58.5	9.861 4090	-584
	3	359 4 17.0	1 35 25.1	-1 20.1	-3 18 18.9	+1 16.9	9.861 2889	-616

## FOR GREENWICH MEAN NOON.

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		" ' "	" ' "	" "	" ' "	" "		
Apr.	1	355 53 29.5	1 35 22.4	-1 1.6	-3 20 34.3	+0 58.5	9.861 4090	-584
	3	359 4 17.0	1 35 25.1	1 20.1	3 18 18.9	1 16.9	9.861 2889	616
	5	2 15 9.9	1 35 27.9	1 37.6	3 15 26.9	1 35.1	9.861 1627	646
	7	5 26 8.5	1 35 30.7	1 53.8	3 11 58.6	1 53.1	9.861 0307	674
	9	8 37 12.7	1 35 33.5	2 8.7	3 7 54.6	2 10.8	9.860 8934	699
	11	11 48 22.7	1 35 36.5	-2 22.1	-3 3 15.8	+2 28.0	9.860 7513	-722
	13	14 59 38.6	1 35 39.4	2 33.7	2 58 2.9	2 44.9	9.860 6046	744
	15	18 11 0.5	1 35 42.5	2 43.3	2 52 16.7	3 1.2	9.860 4540	763
	17	21 22 28.5	1 35 45.5	2 51.0	2 45 58.3	3 17.1	9.860 2997	779
	19	24 34 2.5	1 35 48.6	2 56.5	2 39 8.7	3 32.4	9.860 1424	794
	21	27 45 42.8	1 35 51.7	-2 59.9	-2 31 49.2	+3 47.0	9.859 9824	-806
	23	30 57 29.4	1 35 54.9	3 1.0	2 24 1.0	4 1.0	9.859 8203	815
	25	34 9 22.4	1 35 58.1	2 59.9	2 15 45.7	4 14.2	9.859 6566	822
	27	37 21 21.8	1 36 1.3	2 56.5	2 7 4.6	4 26.7	9.859 4918	826
	29	40 33 27.8	1 36 4.7	2 51.0	1 57 59.4	4 38.4	9.859 3265	827
May	1	43 45 40.5	1 36 8.0	-2 43.3	-1 48 31.6	+4 49.3	9.859 1611	-826
	3	46 57 59.9	1 36 11.4	2 33.5	1 38 43.0	4 59.2	9.858 9961	823
	5	50 10 26.1	1 36 14.8	2 21.8	1 28 35.5	5 8.2	9.858 8320	817
	7	53 22 59.1	1 36 18.3	2 8.3	1 18 10.8	5 16.3	9.858 6694	808
	9	56 35 39.2	1 36 21.8	1 53.2	1 7 31.0	5 23.4	9.858 5089	797
	11	59 48 26.4	1 36 25.4	-1 36.7	-0 56 37.9	+5 29.5	9.858 3508	-783
	13	63 1 20.7	1 36 28.9	1 18.9	0 45 33.7	5 34.6	9.858 1957	767
	15	66 14 22.2	1 36 32.5	1 0.1	0 34 20.4	5 38.6	9.858 0441	748
	17	69 27 30.8	1 36 36.1	0 40.6	0 23 0.1	5 41.5	9.857 8965	727
	19	72 40 46.8	1 36 39.8	0 20.5	0 11 35.0	5 43.4	9.857 7534	704
	21	75 54 10.0	1 36 43.4	-0 0.2	-0 0 7.3	+5 44.1	9.857 6152	-678
	23	79 7 40.5	1 36 47.0	+0 20.2	+0 11 20.8	5 43.8	9.857 4824	650
	25	82 21 18.1	1 36 50.6	0 40.3	0 22 47.3	5 42.4	9.857 3553	620
	27	85 35 2.9	1 36 54.2	0 59.9	0 34 9.8	5 39.9	9.857 2344	588
	29	88 48 54.8	1 36 57.7	1 18.7	0 45 26.1	5 36.3	9.857 1202	554
	31	92 2 53.6	1 37 1.1	+1 36.6	+0 56 34.1	+5 31.5	9.857 0129	-519
June	2	95 16 59.1	1 37 4.4	1 53.3	1 7 31.5	5 25.7	9.856 9128	481
	4	98 31 11.3	1 37 7.7	2 8.5	1 18 16.4	5 18.9	9.856 8205	442
	6	101 45 29.8	1 37 10.8	2 22.0	1 28 46.6	5 11.0	9.856 7360	402
	8	104 59 54.5	1 37 13.8	2 33.8	1 39 0.0	5 2.1	9.856 6599	360
	10	108 14 25.0	1 37 16.7	+2 43.6	+1 48 54.5	+4 52.3	9.856 5922	-317
	12	111 29 1.0	1 37 19.3	2 51.3	1 58 28.4	4 41.4	9.856 5332	273
	14	114 43 42.1	1 37 21.8	2 56.8	2 7 39.6	4 29.6	9.856 4831	228
	16	117 58 28.0	1 37 24.0	3 0.1	2 16 26.4	4 17.0	9.856 4420	183
	18	121 13 18.1	1 37 26.0	3 1.0	2 24 47.0	4 3.5	9.856 4101	136
	20	124 28 12.0	1 37 27.8	+2 59.6	+2 32 39.8	+3 49.2	9.856 3875	-90
	22	127 43 9.2	1 37 29.3	2 55.9	2 40 3.2	3 34.1	9.856 3743	-42
	24	130 58 9.1	1 37 30.6	2 50.0	2 46 55.9	3 18.4	9.856 3706	+5
	26	134 13 11.2	1 37 31.5	2 41.9	2 53 16.3	3 2.0	9.856 3762	52
	28	137 28 14.7	1 37 32.1	2 31.6	2 59 3.4	2 45.0	9.856 3912	99
	30	140 43 19.2	1 37 32.3	+2 19.5	+3 4 15.9	+2 27.4	9.856 4156	+145
July	2	143 58 23.8	1 37 32.2	+2 5.5	+3 8 52.8	+2 9.4	9.856 4493	+192

## FOR GREENWICH MEAN NOON.

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		° ' "	° ' "	' "	° ' "	' "		
July	2	143 58 23.8	1 37 32.2	+2 5.5	+3 8 52.8	+2 9.4	9.856 4493	+192
	4	147 13 28.0	1 37 31.9	1 49.9	3 12 53.3	1 51.0	9.856 4922	237
	6	150 28 31.1	1 37 31.1	1 33.0	3 16 16.6	1 32.2	9.856 5440	281
	8	153 43 32.3	1 37 30.0	1 14.8	3 19 2.0	1 13.1	9.856 6047	325
	10	156 58 31.0	1 37 28.6	0 55.7	3 21 9.0	0 53.8	9.856 6740	368
	12	160 13 26.5	1 37 26.8	+0 35.8	+3 22 37.3	+0 34.4	9.856 7517	+409
	14	163 28 18.0	1 37 24.7	+0 15.6	3 23 26.6	+0 14.9	9.856 8376	450
	16	166 43 4.9	1 37 22.2	-0 4.9	3 23 36.8	-0 4.7	9.856 9314	488
	18	169 57 46.4	1 37 19.3	0 25.3	3 23 7.9	0 24.2	9.857 0327	525
	20	173 12 22.0	1 37 16.2	0 45.4	3 22 0.0	0 43.6	9.857 1418	561
	22	176 26 51.0	1 37 12.8	-1 4.9	+3 20 13.4	-1 2.9	9.857 2568	+594
	24	179 41 12.8	1 37 9.0	1 23.5	3 17 48.6	1 21.9	9.857 3788	626
	26	182 55 26.8	1 37 5.0	1 41.1	3 14 46.1	1 40.6	9.857 5069	655
	28	186 9 32.5	1 37 0.7	1 57.4	3 11 6.5	1 59.0	9.857 6407	683
	30	189 23 29.4	1 36 56.2	2 12.1	3 6 50.6	2 16.9	9.857 7798	708
Aug.	1	192 37 17.0	1 36 51.4	-2 25.2	+3 1 59.4	-2 34.3	9.857 9237	+731
	3	195 50 55.0	1 36 46.5	2 36.4	2 56 33.8	2 51.2	9.858 0719	751
	5	199 4 22.9	1 36 41.4	2 45.7	2 50 34.9	3 7.6	9.858 2240	769
	7	202 17 40.5	1 36 36.2	2 52.8	2 44 3.9	3 23.3	9.858 3795	785
	9	205 30 47.6	1 36 30.9	2 57.8	2 37 2.2	3 38.3	9.858 5379	799
	11	208 43 43.9	1 36 25.5	-3 0.5	+2 29 31.1	-3 52.7	9.858 6988	+809
	13	211 56 29.4	1 36 20.0	3 0.9	2 21 32.1	4 6.2	9.858 8615	817
	15	215 9 3.8	1 36 14.5	2 59.1	2 13 6.9	4 18.9	9.859 0255	823
	17	218 21 27.3	1 36 9.0	2 55.0	2 4 17.1	4 30.8	9.859 1904	826
	19	221 33 39.9	1 36 3.5	2 48.8	1 55 4.4	4 41.8	9.859 3556	826
	21	224 45 41.5	1 35 58.1	-2 40.4	+1 45 30.7	-4 51.9	9.859 5207	+824
	23	227 57 32.4	1 35 52.8	2 30.1	1 35 37.6	5 1.0	9.859 6850	819
	25	231 9 12.7	1 35 47.6	2 17.9	1 25 27.2	5 9.2	9.859 8482	812
	27	234 20 42.8	1 35 42.5	2 4.0	1 15 1.3	5 16.5	9.860 0097	802
	29	237 32 2.8	1 35 37.5	1 48.5	1 4 21.9	5 22.7	9.860 1689	790
Sept.	31	240 43 13.1	1 35 32.8	-1 31.8	+0 53 31.1	-5 27.9	9.860 3255	+775
	2	243 54 14.1	1 35 28.2	1 13.9	0 42 30.8	5 32.2	9.860 4789	758
	4	247 5 6.2	1 35 23.9	0 55.1	0 31 23.1	5 35.4	9.860 6286	739
	6	250 15 49.9	1 35 19.8	0 35.7	0 20 10.0	5 37.6	9.860 7742	717
	8	253 26 25.5	1 35 15.9	-0 15.8	+0 8 53.6	5 38.6	9.860 9152	693
	10	256 36 53.7	1 35 12.3	+0 4.3	-0 2 23.9	-5 38.7	9.861 0512	+667
	12	259 47 15.0	1 35 9.0	0 24.3	0 13 40.6	5 37.8	9.861 1819	639
	14	262 57 29.7	1 35 5.9	0 44.0	0 24 54.4	5 35.8	9.861 3068	610
	16	266 7 38.7	1 35 3.1	1 3.1	0 36 3.2	5 32.8	9.861 4256	578
	18	269 17 42.2	1 35 0.6	1 21.4	0 47 5.1	5 28.9	9.861 5378	544
	20	272 27 41.1	1 34 58.4	+1 38.8	-0 57 58.0	-5 23.9	9.861 6432	+509
	22	275 37 35.8	1 34 56.4	1 54.9	1 8 39.9	5 17.9	9.861 7414	473
	24	278 47 27.0	1 34 54.8	2 9.6	1 19 9.1	5 11.0	9.861 8322	435
	26	281 57 15.2	1 34 53.5	2 22.8	1 29 23.5	5 3.2	9.861 9152	395
	28	285 7 1.1	1 34 52.4	2 34.2	1 39 21.4	4 54.5	9.861 9902	355
	30	288 16 45.0	1 34 51.6	+2 43.7	-1 49 1.0	-4 44.9	9.862 0571	+313
Oct.	2	291 26 27.6	1 34 51.1	+2 51.2	-1 58 20.4	-4 34.4	9.862 1155	+271

## FOR GREENWICH MEAN NOON.

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		° ' "	° ' "	' "	° ' "	' "		
Oct.	2	291 26 27.6	1 34 51.1	+2 51.2	-1 58 20.4	-4 34.4	9.862 1155	+271
	4	294 36 9.6	1 34 50.8	2 56.6	2 7 18.2	4 23.2	9.862 1654	228
	6	297 45 51.2	1 34 50.8	2 59.9	2 15 52.6	4 11.1	9.862 2066	184
	8	300 55 33.1	1 34 51.1	3 1.0	2 24 2.1	3 58.3	9.862 2389	139
	10	304 5 15.8	1 34 51.6	2 59.9	2 31 45.2	3 44.8	9.862 2622	94
	12	307 14 59.6	1 34 52.3	+2 56.6	-2 39 0.6	-3 30.6	9.862 2766	+ 49
	14	310 24 45.2	1 34 53.3	2 51.2	2 45 47.0	3 15.7	9.862 2819	+ 4
	16	313 34 32.8	1 34 54.3	2 43.6	2 52 3.2	3 0.3	9.862 2781	- 41
	18	316 44 22.7	1 34 55.6	2 34.1	2 57 48.0	2 44.4	9.862 2653	87
	20	319 54 15.5	1 34 57.1	2 22.7	3 3 0.3	2 27.9	9.862 2434	132
	22	323 4 11.3	1 34 58.8	+2 9.6	-3 7 39.2	-2 11.0	9.862 2126	-176
	24	326 14 10.6	1 35 0.6	1 54.8	3 11 43.9	1 53.6	9.862 1730	220
	26	329 24 13.6	1 35 2.5	1 38.7	3 15 13.5	1 35.9	9.862 1245	264
	28	332 34 20.6	1 35 4.5	1 21.4	3 18 7.5	1 18.0	9.862 0675	306
	30	335 44 31.8	1 35 6.7	1 3.0	3 20 25.2	0 59.7	9.862 0020	348
Nov.	1	338 54 47.4	1 35 8.9	+0 43.9	-3 22 6.3	-0 41.3	9.861 9283	-389
	3	342 5 7.6	1 35 11.3	0 24.3	3 23 10.3	0 22.7	9.861 8466	428
	5	345 15 32.6	1 35 13.8	+0 4.3	3 23 37.1	-0 4.0	9.861 7571	467
	7	348 26 2.7	1 35 16.3	-0 15.7	3 23 26.4	+0 14.7	9.861 6600	504
	9	351 36 37.8	1 35 18.9	0 35.6	3 22 38.4	0 33.4	9.861 5557	539
	11	354 47 18.2	1 35 21.5	-0 55.0	-3 21 13.0	+0 52.0	9.861 4444	-573
	13	357 58 4.0	1 35 24.2	1 13.7	3 19 10.5	1 10.5	9.861 3266	605
	15	1 8 55.2	1 35 27.0	1 31.6	3 16 31.2	1 28.8	9.861 2025	635
	17	4 19 51.9	1 35 29.8	1 48.3	3 13 15.5	1 46.9	9.861 0726	663
	19	7 30 54.3	1 35 32.7	2 3.7	3 9 23.9	2 4.6	9.860 9373	690
	21	10 42 2.6	1 35 35.6	-2 17.6	-3 4 57.2	+2 22.0	9.860 7968	-714
	23	13 53 16.6	1 35 38.5	2 29.8	2 59 56.1	2 39.0	9.860 6517	736
	25	17 4 36.6	1 35 41.5	2 40.2	2 54 21.4	2 55.6	9.860 5025	756
	27	20 16 2.6	1 35 44.5	2 48.6	2 48 14.1	3 11.7	9.860 3495	774
	29	23 27 34.7	1 35 47.6	2 54.9	2 41 35.2	3 27.1	9.860 1932	789
Dec.	1	26 39 13.0	1 35 50.7	-2 59.0	-2 34 26.0	+3 42.0	9.860 0342	-801
	3	29 50 57.6	1 35 53.9	3 0.9	2 26 47.7	3 56.2	9.859 8729	812
	5	33 2 48.5	1 35 57.1	3 0.6	2 18 41.7	4 9.7	9.859 7097	820
	7	36 14 45.9	1 36 0.3	2 58.0	2 10 9.4	4 22.5	9.859 5453	824
	9	39 26 49.8	1 36 3.6	2 53.2	2 1 12.4	4 34.4	9.859 3802	827
	11	42 39 0.3	1 36 6.9	-2 46.2	-1 51 52.2	+4 45.6	9.859 2148	-827
	13	45 51 17.5	1 36 10.3	2 37.1	1 42 10.7	4 55.8	9.859 0496	824
	15	49 3 41.6	1 36 13.7	2 26.1	1 32 9.5	5 5.2	9.858 8852	819
	17	52 16 12.4	1 36 17.2	2 13.2	1 21 50.6	5 13.6	9.858 7221	811
	19	55 28 50.3	1 36 20.7	1 58.7	1 11 15.9	5 21.0	9.858 5608	801
	21	58 41 35.2	1 36 24.2	-1 42.6	-1 0 27.2	+5 27.5	9.858 4019	-788
	23	61 54 27.3	1 36 27.8	1 25.3	0 49 26.6	5 32.9	9.858 2458	7.3
	25	65 7 26.4	1 36 31.4	1 6.8	0 38 16.2	5 37.3	9.858 0930	755
	27	68 20 32.8	1 36 35.0	0 47.5	0 26 58.1	5 40.6	9.857 9441	734
	29	71 33 46.5	1 36 38.7	0 27.6	0 15 34.4	5 42.9	9.857 7995	712
	31	74 47 7.4	1 36 42.3	-0 7.3	-0 4 7.4	+5 44.0	9.857 6596	-687
	33	78 0 35.5	1 36 45.9	+0 13.1	+0 7 20.9	+5 44.0	9.857 5250	-659



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	" ' "	"			"	"	h m
Jan. 1	19 43 7.78	+8.316	-22 25 0.4	+19.91	0.368 8986	+68.1	2.16	3.76	1 0.8
2	19 46 27.23	8.305	22 16 55.0	20.54	0.369 0607	67.0	2.16	3.76	1 0.2
3	19 49 46.41	8.293	22 8 34.4	21.17	0.369 2203	66.0	2.16	3.76	0 59.6
4	19 53 5.31	8.282	21 59 58.7	21.80	0.369 3776	65.0	2.16	3.76	0 59.0
5	19 56 23.93	8.270	21 51 8.0	22.42	0.369 5325	64.1	2.16	3.76	0 58.3
6	19 59 42.26	+8.257	-21 42 2.5	+23.04	0.369 6851	+63.1	2.16	3.76	0 57.7
7	20 3 0.28	8.244	21 32 42.3	23.65	0.369 8356	62.2	2.15	3.75	0 57.1
8	20 6 17.98	8.231	21 23 7.5	24.25	0.369 9839	61.4	2.15	3.75	0 56.4
9	20 9 35.36	8.218	21 13 18.2	24.85	0.370 1303	60.6	2.15	3.75	0 55.8
10	20 12 52.42	8.204	21 3 14.6	25.45	0.370 2746	59.7	2.15	3.75	0 55.1
11	20 16 9.13	+8.189	-20 52 56.8	+26.04	0.370 4169	+58.9	2.15	3.75	0 54.4
12	20 19 25.50	8.175	20 42 24.8	26.62	0.370 5573	58.1	2.15	3.75	0 53.8
13	20 22 41.51	8.160	20 31 39.0	27.19	0.370 6958	57.3	2.15	3.75	0 53.1
14	20 25 57.17	8.145	20 20 39.4	27.77	0.370 8323	56.5	2.15	3.75	0 52.4
15	20 29 12.46	8.129	20 9 26.3	28.33	0.370 9668	55.7	2.15	3.75	0 51.7
16	20 32 27.38	+8.114	-19 57 59.6	+28.89	0.371 0995	+54.9	2.15	3.74	0 51.0
17	20 35 41.91	8.098	19 46 19.7	29.44	0.371 2302	54.0	2.15	3.74	0 50.3
18	20 38 56.06	8.082	19 34 26.6	29.98	0.371 3589	53.2	2.15	3.74	0 49.6
19	20 42 9.82	8.065	19 22 20.6	30.52	0.371 4857	52.4	2.15	3.74	0 48.9
20	20 45 23.18	8.048	19 10 1.8	31.05	0.371 6105	51.6	2.15	3.74	0 48.2
21	20 48 36.14	+8.032	-18 57 30.3	+31.57	0.371 7334	+50.8	2.15	3.74	0 47.5
22	20 51 48.70	8.015	18 44 46.4	32.08	0.371 8541	49.9	2.15	3.74	0 46.7
23	20 55 0.84	7.997	18 31 50.3	32.59	0.371 9728	49.0	2.15	3.74	0 46.0
24	20 58 12.55	7.979	18 18 42.2	33.09	0.372 0894	48.2	2.15	3.74	0 45.3
25	21 1 23.84	7.961	18 5 22.2	33.58	0.372 2041	47.3	2.14	3.73	0 44.5
26	21 4 34.70	+7.943	-17 51 50.6	+34.06	0.372 3166	+46.5	2.14	3.73	0 43.7
27	21 7 45.11	7.925	17 38 7.5	34.53	0.372 4274	45.8	2.14	3.73	0 43.0
28	21 10 55.09	7.907	17 24 13.3	34.99	0.372 5363	45.0	2.14	3.73	0 42.2
29	21 14 4.62	7.888	17 10 8.0	35.45	0.372 6436	44.3	2.14	3.73	0 41.4
30	21 17 13.71	7.869	16 55 51.8	35.90	0.372 7492	43.7	2.14	3.73	0 40.6
31	21 20 22.35	+7.851	-16 41 25.0	+36.34	0.372 8534	+43.1	2.14	3.73	0 39.8
Feb. 1	21 23 30.54	7.832	16 26 47.8	36.77	0.372 9561	42.5	2.14	3.73	0 39.0
2	21 26 38.29	7.814	16 12 0.3	37.19	0.373 0574	41.9	2.14	3.73	0 38.2
3	21 29 45.59	7.795	15 57 2.8	37.60	0.373 1572	41.3	2.14	3.73	0 37.4
4	21 32 52.45	7.777	15 41 55.4	38.01	0.373 2557	40.8	2.14	3.73	0 36.6
5	21 35 58.87	+7.758	-15 26 38.3	+38.41	0.373 3529	+40.3	2.14	3.72	0 35.7
6	21 39 4.84	7.740	15 11 11.8	38.80	0.373 4490	39.8	2.14	3.72	0 34.9
7	21 42 10.38	7.722	14 55 36.0	39.18	0.373 5439	39.3	2.14	3.72	0 34.0
8	21 45 15.49	7.704	14 39 51.1	39.55	0.373 6377	38.8	2.14	3.72	0 33.2
9	21 48 20.16	7.686	14 23 57.3	39.92	0.373 7303	38.4	2.14	3.72	0 32.3
10	21 51 24.40	+7.668	-14 7 54.9	+40.28	0.373 8218	+37.9	2.14	3.72	0 31.4
11	21 54 28.22	7.650	13 51 44.0	40.63	0.373 9121	37.4	2.14	3.72	0 30.6
12	21 57 31.62	7.633	13 35 24.8	40.97	0.374 0013	36.9	2.14	3.72	0 29.7
13	22 0 34.60	7.616	13 18 57.5	41.30	0.374 0894	36.4	2.14	3.72	0 28.8
14	22 3 37.18	7.599	13 2 22.4	41.62	0.374 1762	35.9	2.14	3.72	0 27.9
15	22 6 39.35	+7.582	-12 45 39.6	+41.94	0.374 2618	+35.4	2.14	3.72	0 27.0
16	22 9 41.12	+7.565	-12 28 49.3	+42.25	0.374 3462	+34.9	2.14	3.72	0 26.1

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
<b>Feb. 16</b>	22	9	41.12	+7.565	-12	28	49.3	+42.25	0.374 3462	+34.9	2.14	3.72	0 26.1
17	22	12	42.49	7.549	12	11	51.7	42.55	0.374 4292	34.3	2.14	3.72	0 25.1
18	22	15	43.46	7.533	11	54	47.1	42.84	0.374 5107	33.7	2.13	3.71	0 24.2
19	22	18	44.05	7.516	11	37	35.7	43.11	0.374 5908	33.0	2.13	3.71	0 23.3
20	22	21	44.24	7.500	11	20	17.8	43.38	0.374 6693	32.4	2.13	3.71	0 22.3
21	22	24	44.05	+7.484	-11	2	53.5	+43.64	0.374 7463	+31.7	2.13	3.71	0 21.4
22	22	27	43.48	7.468	10	45	23.1	43.89	0.374 8217	31.1	2.13	3.71	0 20.4
23	22	30	42.53	7.453	10	27	46.8	44.13	0.374 8956	30.5	2.13	3.71	0 19.5
24	22	33	41.21	7.437	10	10	4.7	44.37	0.374 9680	29.9	2.13	3.71	0 18.5
25	22	36	39.52	7.422	9	52	17.2	44.59	0.375 0389	29.2	2.13	3.71	0 17.6
26	22	39	37.46	+7.407	-9	34	24.4	+44.80	0.375 1083	+28.6	2.13	3.71	0 16.6
27	22	42	35.04	7.392	9	16	26.6	45.00	0.375 1764	28.1	2.13	3.71	0 15.6
28	22	45	32.27	7.377	8	58	24.0	45.20	0.375 2431	27.5	2.13	3.71	0 14.6
<b>Mar. 1</b>	22	48	29.15	7.363	8	40	16.8	45.39	0.375 3086	27.0	2.13	3.71	0 13.6
2	22	51	25.69	7.349	8	22	5.1	45.58	0.375 3728	26.5	2.13	3.71	0 12.6
3	22	54	21.90	+7.335	-8	3	49.2	+45.75	0.375 4359	+26.0	2.13	3.71	0 11.6
4	22	57	17.78	7.322	7	45	29.3	45.91	0.375 4978	25.6	2.13	3.71	0 10.6
5	23	0	13.35	7.309	7	27	5.6	46.06	0.375 5586	25.1	2.13	3.71	0 9.6
6	23	3	8.60	7.296	7	8	38.3	46.21	0.375 6182	24.6	2.12	3.70	0 8.6
7	23	6	3.55	7.284	6	50	7.6	46.35	0.375 6768	24.2	2.12	3.70	0 7.5
8	23	8	58.21	+7.272	-6	31	33.7	+46.48	0.375 7343	+23.7	2.12	3.70	0 6.5
9	23	11	52.59	7.260	6	12	56.7	46.60	0.375 7906	23.2	2.12	3.70	0 5.5
10	23	14	46.69	7.249	5	54	16.9	46.71	0.375 8458	22.8	2.12	3.70	0 4.4
11	23	17	40.53	7.238	5	35	34.4	46.82	0.375 8999	22.3	2.12	3.70	0 3.4
12	23	20	34.11	7.227	5	16	49.5	46.92	0.375 9528	21.8	2.12	3.70	0 2.3
13	23	23	27.44	+7.217	-4	58	2.3	+47.01	0.376 0046	+21.3	2.12	3.70	0 1.3
14	23	26	20.53	7.207	4	39	13.1	47.09	0.376 0550	20.7	2.12	3.70	0 0.3
15	23	29	13.39	7.198	4	20	22.0	47.17	0.376 1041	20.1	2.12	3.70	23 58.1
16	23	32	6.04	7.189	4	1	29.2	47.23	0.376 1517	19.5	2.12	3.70	23 57.0
17	23	34	58.47	7.180	3	42	35.0	47.29	0.376 1979	18.9	2.12	3.70	23 55.9
18	23	37	50.69	+7.172	-3	23	39.5	+47.34	0.376 2426	+18.3	2.12	3.70	23 54.9
19	23	40	42.72	7.164	3	4	42.9	47.37	0.376 2857	17.6	2.12	3.70	23 53.8
20	23	43	34.56	7.156	2	45	45.4	47.40	0.376 3270	16.8	2.12	3.70	23 52.7
21	23	46	26.21	7.149	2	26	47.3	47.43	0.376 3665	16.1	2.12	3.70	23 51.6
22	23	49	17.69	7.141	2	7	48.7	47.44	0.376 4042	15.3	2.12	3.70	23 50.6
23	23	52	8.99	+7.134	-1	48	49.9	+47.45	0.376 4399	+14.5	2.12	3.70	23 49.5
24	23	55	0.13	7.128	1	29	51.0	47.45	0.376 4736	13.6	2.12	3.70	23 48.3
25	23	57	51.11	7.121	1	10	52.4	47.44	0.376 5053	12.8	2.12	3.70	23 47.2
26	0	0	41.94	7.115	0	51	54.1	47.42	0.376 5351	12.0	2.12	3.70	23 46.1
27	0	3	32.62	7.109	0	32	56.3	47.39	0.376 5630	11.2	2.12	3.70	23 45.0
28	0	6	23.17	+7.104	-0	13	59.3	+47.36	0.376 5890	+10.4	2.12	3.70	23 44.0
29	0	9	13.59	7.098	+	0	56.8	47.31	0.376 6131	9.7	2.12	3.70	23 42.9
30	0	12	3.88	7.093	0	23	51.7	47.26	0.376 6354	8.9	2.12	3.70	23 41.8
31	0	14	54.06	7.089	0	42	45.3	47.20	0.376 6560	8.2	2.12	3.70	23 40.7
<b>Apr. 1</b>	0	17	44.14	7.085	1	1	37.5	47.14	0.376 6748	7.4	2.12	3.70	23 39.6
2	0	20	34.12	+7.081	+	1	20	28.0	+47.07	+6.7	2.12	3.70	23 38.4
3	0	23	24.01	+7.077	+	1	39	16.6	+46.99	+5.9	2.12	3.70	23 37.3

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.
	h	m	s		°	'	"						
Apr.	1	0	17 44.14	+7.085	+	1	1 37.5	+47.14	0.376 6748	+ 7.4	2.12	3.70	23 39.6
	2	0	20 34.12	7.081		1	20 28.0	47.07	0.376 6917	6.7	2.12	3.70	23 38.4
	3	0	23 24.01	7.077		1	39 16.6	46.99	0.376 7068	5.9	2.12	3.70	23 37.3
	4	0	26 13.82	7.074		1	58 3.3	46.90	0.376 7200	5.1	2.12	3.70	23 36.2
	5	0	29 3.56	7.071		2	16 47.8	46.80	0.376 7314	4.4	2.12	3.70	23 35.1
	6	0	31 53.24	+7.069	+	2	35 29.9	+46.70	0.376 7409	+ 3.6	2.12	3.70	23 34.0
	7	0	34 42.86	7.067		2	54 9.5	46.59	0.376 7486	2.8	2.12	3.70	23 32.9
	8	0	37 32.45	7.065		3	12 46.5	46.48	0.376 7545	2.1	2.12	3.70	23 31.8
	9	0	40 22.00	7.064		3	31 20.6	46.36	0.376 7585	1.2	2.12	3.70	23 30.6
	10	0	43 11.53	7.063		3	49 51.6	46.23	0.376 7604	+ 0.4	2.12	3.70	23 29.5
	11	0	46 1.04	+7.063	+	4	8 19.5	+46.09	0.376 7603	- 0.5	2.12	3.70	23 28.4
	12	0	48 50.54	7.063		4	26 44.1	45.95	0.376 7579	1.5	2.12	3.70	23 27.3
	13	0	51 40.05	7.063		4	45 5.1	45.80	0.376 7532	2.4	2.12	3.70	23 26.2
	14	0	54 29.56	7.063		5	3 22.4	45.64	0.376 7461	3.5	2.12	3.70	23 25.1
	15	0	57 19.09	7.064		5	21 35.9	45.48	0.376 7364	4.6	2.12	3.70	23 23.9
	16	1	0 8.64	+7.065	+	5	39 45.3	+45.31	0.376 7242	- 5.7	2.12	3.70	23 22.8
	17	1	2 58.23	7.067		5	57 50.5	45.13	0.376 7092	0.8	2.12	3.70	23 21.7
	18	1	5 47.85	7.068		6	15 51.3	44.94	0.376 6915	8.0	2.12	3.70	23 20.6
	19	1	8 37.51	7.070		6	33 47.6	44.75	0.376 6709	9.2	2.12	3.70	23 19.5
	20	1	11 27.22	7.072		6	51 39.1	44.55	0.376 6473	10.5	2.12	3.70	23 18.3
	21	1	14 16.98	+7.074	+	7	9 25.8	+44.34	0.376 6207	-11.7	2.12	3.70	23 17.2
	22	1	17 6.79	7.077		7	27 7.3	44.12	0.376 5911	13.0	2.12	3.70	23 16.1
	23	1	19 56.67	7.080		7	44 43.6	43.90	0.376 5584	14.3	2.12	3.70	23 15.0
	24	1	22 46.61	7.082		8	2 14.4	43.67	0.376 5226	15.6	2.12	3.70	23 13.9
	25	1	25 36.62	7.085		8	19 39.7	43.43	0.376 4836	16.9	2.12	3.70	23 12.8
	26	1	28 26.70	+7.088	+	8	36 59.1	+43.19	0.376 4415	-18.2	2.12	3.70	23 11.7
	27	1	31 16.86	7.092		8	54 12.7	42.94	0.376 3962	19.5	2.12	3.70	23 10.6
	28	1	34 7.11	7.096		9	11 20.2	42.68	0.376 3479	20.8	2.12	3.70	23 9.5
	29	1	36 57.44	7.099		9	28 21.5	42.42	0.376 2963	22.1	2.12	3.70	23 8.4
	30	1	39 47.87	7.104		9	45 16.4	42.15	0.376 2417	23.4	2.12	3.70	23 7.3
May	1	1 42 38.41	+7.106	+10	2	4.8	+41.88	0.376 1838	-24.8	2.12	3.70	23 6.2	
	2	1 45 29.05	7.112		10	18 46.6	41.00	0.376 1227	26.1	2.12	3.70	23 5.1	
	3	1 48 19.80	7.117		10	35 21.5	41.31	0.376 0583	27.5	2.12	3.70	23 4.0	
	4	1 51 10.67	7.122		10	51 49.6	41.02	0.375 9907	28.8	2.12	3.70	23 2.9	
	5	1 54 1.67	7.128		11	8 10.5	40.72	0.375 9199	30.2	2.12	3.70	23 1.8	
	6	1 56 52.79	+7.133	+11	24 24.2	+40.42	0.375 8458	-31.6	2.12	3.70	23 0.8		
	7	1 59 44.05	7.139		11	40 30.6	40.11	0.375 7684	33.0	2.12	3.70	22 59.7	
	8	2 2 35.46	7.145		11	56 29.5	39.79	0.375 6875	34.4	2.12	3.70	22 58.6	
	9	2 5 27.01	7.151		12	12 20.7	39.47	0.375 6031	35.9	2.12	3.70	22 57.5	
	10	2 8 18.71	7.158		12	28 4.2	39.15	0.375 5151	37.4	2.13	3.71	22 56.4	
	11	2 11 10.57	+7.164	+12	43 39.9	+38.82	0.375 4235	-39.0	2.13	3.71	22 55.3		
	12	2 14 2.60	7.171		12	59 7.5	38.48	0.375 3279	40.6	2.13	3.71	22 54.3	
	13	2 16 54.79	7.178		13	14 26.9	38.14	0.375 2284	42.3	2.13	3.71	22 53.2	
	14	2 19 47.15	7.186		13	29 38.0	37.79	0.375 1247	44.1	2.13	3.71	22 52.1	
	15	2 22 39.69	7.193		13	44 40.7	37.43	0.375 0168	45.9	2.13	3.71	22 51.1	
	16	2 25 32.39	+7.200	+13	59 34.8	+37.07	0.374 9045	-47.7	2.13	3.71	22 50.0		
	17	2 28 25.27	+7.207	+14	14 20.2	+36.71	0.374 7877	-49.6	2.13	3.71	22 49.0		

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	"	"	"	"	"			"	"	h m
May 17	2	28	25.27	+7.207	+14	14	20.2	+36.71	0.374 7877	-49.6	2.13	3.71	22 49.0
18	2	31	18.32	7.214	14	28	56.7	36.34	0.374 6664	51.5	2.13	3.71	22 47.9
19	2	34	11.54	7.221	14	43	24.2	35.96	0.374 5404	53.5	2.13	3.71	22 46.9
20	2	37	4.94	7.229	14	57	42.6	35.57	0.374 4097	55.4	2.14	3.72	22 45.8
21	2	39	58.51	7.236	15	11	51.6	35.18	0.374 2743	57.4	2.14	3.72	22 44.8
22	2	42	52.26	+7.243	+15	25	51.3	+34.79	0.374 1341	-59.4	2.14	3.72	22 43.7
23	2	45	46.18	7.250	15	39	41.4	34.39	0.373 9890	61.5	2.14	3.72	22 42.7
24	2	48	40.26	7.257	15	53	21.9	33.98	0.373 8391	63.5	2.14	3.72	22 41.6
25	2	51	34.52	7.264	16	6	52.6	33.58	0.373 6841	65.6	2.14	3.72	22 40.6
26	2	54	28.95	7.272	16	20	13.5	33.16	0.373 5242	67.7	2.14	3.72	22 39.6
27	2	57	23.55	+7.279	+16	33	24.4	+32.74	0.373 3593	-69.7	2.14	3.72	22 38.5
28	3	0	18.31	7.286	16	46	25.1	32.32	0.373 1895	71.8	2.14	3.73	22 37.5
29	3	3	13.25	7.293	16	59	15.7	31.88	0.373 0146	73.9	2.14	3.73	22 36.5
30	3	6	8.35	7.300	17	11	55.9	31.46	0.372 8348	76.0	2.14	3.73	22 35.5
31	3	9	3.62	7.307	17	24	25.7	31.02	0.372 6499	78.1	2.14	3.73	22 34.4
June 1	3	11	59.06	+7.314	+17	36	45.0	+30.58	0.372 4599	-80.2	2.14	3.73	22 33.4
2	3	14	54.67	7.321	17	48	53.7	30.14	0.372 2648	82.3	2.14	3.73	22 32.4
3	3	17	50.44	7.327	18	0	51.7	29.69	0.372 0646	84.5	2.15	3.74	22 31.4
4	3	20	46.38	7.334	18	12	38.8	29.24	0.371 8591	86.7	2.15	3.74	22 30.4
5	3	23	42.49	7.341	18	24	15.0	28.78	0.371 6483	89.0	2.15	3.74	22 29.4
6	3	26	38.77	+7.348	+18	35	40.3	+28.32	0.371 4321	-91.2	2.15	3.74	22 28.4
7	3	29	35.21	7.355	18	46	54.5	27.86	0.371 2105	93.5	2.15	3.74	22 27.4
8	3	32	31.82	7.362	18	57	57.6	27.39	0.370 9832	95.9	2.15	3.75	22 26.4
9	3	35	28.59	7.369	19	8	49.4	26.92	0.370 7503	98.3	2.15	3.75	22 25.4
10	3	38	25.53	7.376	19	19	29.8	26.45	0.370 5115	100.8	2.15	3.75	22 24.4
11	3	41	22.62	+7.382	+19	29	58.8	+25.97	0.370 2666	-103.3	2.15	3.75	22 23.4
12	3	44	19.87	7.389	19	40	16.4	25.49	0.370 0156	105.9	2.15	3.75	22 22.5
13	3	47	17.27	7.395	19	50	22.3	25.00	0.369 7583	108.5	2.16	3.76	22 21.5
14	3	50	14.81	7.401	20	0	16.5	24.51	0.369 4946	111.2	2.16	3.76	22 20.5
15	3	53	12.49	7.406	20	9	59.0	24.02	0.369 2244	114.0	2.16	3.76	22 19.5
16	3	56	10.29	+7.411	+20	19	29.6	+23.53	0.368 9476	-116.7	2.16	3.76	22 18.5
17	3	59	8.23	7.416	20	28	48.3	23.03	0.368 6641	119.5	2.16	3.77	22 17.5
18	4	2	6.28	7.421	20	37	55.0	22.53	0.368 3738	122.4	2.16	3.77	22 16.6
19	4	5	4.44	7.426	20	46	49.7	22.03	0.368 0766	125.3	2.16	3.77	22 15.6
20	4	8	2.71	7.429	20	55	32.2	21.52	0.367 7724	128.2	2.16	3.77	22 14.6
21	4	11	1.06	+7.433	+21	4	2.6	+21.01	0.367 4613	-131.1	2.17	3.78	22 13.6
22	4	13	59.50	7.437	21	12	20.7	20.50	0.367 1431	134.0	2.17	3.78	22 12.7
23	4	16	58.03	7.440	21	20	26.6	19.99	0.366 8179	137.0	2.17	3.78	22 11.7
24	4	19	56.62	7.443	21	28	20.1	19.47	0.366 4856	140.0	2.17	3.78	22 10.8
25	4	22	55.28	7.445	21	36	1.2	18.95	0.366 1461	143.0	2.18	3.79	22 9.8
26	4	25	54.00	+7.448	+21	43	29.9	+18.44	0.365 7994	-146.0	2.18	3.79	22 8.8
27	4	28	52.77	7.450	21	50	46.1	17.92	0.365 4455	149.0	2.18	3.79	22 7.9
28	4	31	51.58	7.452	21	57	49.9	17.40	0.365 0843	152.0	2.18	3.80	22 6.9
29	4	34	50.44	7.453	22	4	41.1	16.87	0.364 7158	155.0	2.18	3.80	22 5.9
30	4	37	49.32	7.454	22	11	19.7	16.35	0.364 3401	158.1	2.18	3.80	22 5.0
July 1	4	40	48.23	+7.455	+22	17	45.8	+15.82	0.363 9571	-161.1	2.19	3.81	22 4.0
2	4	43	47.15	+7.455	+22	23	59.2	+15.29	0.363 5668	-164.2	2.19	3.81	22 3.1

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"					h m
July	1	4 40	48.23	+7.455	+22 17	45.8	+15.82	0.363 9571	-161.1	2.19	3.81	22 4.0	
	2	4 43	47.15	7.455	22 23	59.2	15.29	0.363 5668	164.2	2.19	3.81	22 3.1	
	3	4 46	46.08	7.456	22 29	59.9	14.77	0.363 1690	167.3	2.19	3.81	22 2.1	
	4	4 49	45.02	7.456	22 35	48.0	14.24	0.362 7636	170.5	2.19	3.82	22 1.1	
	5	4 52	43.96	7.456	22 41	23.4	13.71	0.362 3506	173.7	2.19	3.82	22 0.2	
	6	4 55	42.90	+7.455	+22 46	46.1	+13.18	0.361 9297	-177.0	2.19	3.82	21 59.2	
	7	4 58	41.81	7.454	22 51	56.0	12.65	0.361 5010	180.3	2.20	3.83	21 58.3	
	8	5 1	40.71	7.453	22 56	53.2	12.12	0.361 0642	183.7	2.20	3.83	21 57.3	
	9	5 4	39.58	7.452	23 1	37.7	11.59	0.360 6193	187.1	2.20	3.84	21 56.4	
	10	5 7	38.41	7.450	23 6	9.5	11.06	0.360 1661	190.6	2.20	3.84	21 55.4	
	11	5 10	37.20	+7.448	+23 10	28.5	+10.53	0.359 7043	-194.2	2.20	3.84	21 54.4	
	12	5 13	35.93	7.446	23 14	34.7	9.99	0.359 2339	197.8	2.21	3.85	21 53.4	
	13	5 16	34.59	7.443	23 18	28.1	9.46	0.358 7547	201.5	2.21	3.85	21 52.5	
	14	5 19	33.17	7.439	23 22	8.8	8.93	0.358 2666	205.3	2.22	3.86	21 51.5	
	15	5 22	31.65	7.435	23 25	36.7	8.40	0.357 7694	209.1	2.22	3.86	21 50.6	
	16	5 25	30.04	+7.431	+23 28	51.9	+7.87	0.357 2631	-212.9	2.22	3.87	21 49.6	
	17	5 28	28.31	7.426	23 31	54.4	7.34	0.356 7476	216.7	2.22	3.87	21 48.6	
	18	5 31	26.46	7.420	23 34	44.1	6.81	0.356 2228	220.6	2.22	3.87	21 47.7	
	19	5 34	24.47	7.413	23 37	21.2	6.28	0.355 6886	224.5	2.23	3.88	21 46.7	
	20	5 37	22.33	7.407	23 39	45.7	5.76	0.355 1450	228.5	2.23	3.88	21 45.7	
	21	5 40	20.03	+7.401	+23 41	57.5	+5.23	0.354 5920	-232.4	2.23	3.89	21 44.7	
	22	5 43	17.57	7.394	23 43	56.7	4.71	0.354 0294	236.4	2.23	3.89	21 43.7	
	23	5 46	14.92	7.386	23 45	43.4	4.19	0.353 4572	240.4	2.24	3.90	21 42.7	
	24	5 49	12.07	7.377	23 47	17.6	3.67	0.352 8755	244.4	2.24	3.90	21 41.7	
	25	5 52	9.03	7.369	23 48	39.3	3.15	0.352 2841	248.4	2.24	3.91	21 40.7	
	26	5 55	5.78	+7.360	+23 49	48.6	+2.63	0.351 6830	-252.5	2.25	3.92	21 39.7	
	27	5 58	2.30	7.351	23 50	45.5	2.12	0.351 0721	256.6	2.25	3.92	21 38.7	
	28	6 0	58.60	7.341	23 51	30.1	1.60	0.350 4515	260.6	2.26	3.93	21 37.7	
	29	6 3	54.66	7.331	23 52	2.5	1.09	0.349 8211	264.7	2.26	3.93	21 36.7	
	30	6 6	50.48	7.321	23 52	22.6	0.58	0.349 1808	268.9	2.26	3.94	21 35.7	
	31	6 9	46.05	+7.310	+23 52	30.5	+0.08	0.348 5305	-273.0	2.26	3.94	21 34.7	
Aug.	1	6 12	41.35	7.299	23 52	26.3	-0.43	0.347 8702	277.2	2.27	3.95	21 33.7	
	2	6 15	36.39	7.288	23 52	10.0	0.93	0.347 1998	281.5	2.27	3.96	21 32.6	
	3	6 18	31.15	7.276	23 51	41.8	1.43	0.346 5192	285.7	2.27	3.96	21 31.6	
	4	6 21	25.64	7.264	23 51	1.5	1.93	0.345 8283	290.1	2.28	3.97	21 30.6	
	5	6 24	19.83	+7.252	+23 50	9.4	-2.42	0.345 1268	-294.5	2.28	3.97	21 29.5	
	6	6 27	13.74	7.240	23 49	5.5	2.91	0.344 4147	298.9	2.28	3.98	21 28.5	
	7	6 30	7.34	7.227	23 47	49.8	3.40	0.343 6918	303.5	2.29	3.99	21 27.4	
	8	6 33	0.63	7.214	23 46	22.5	3.88	0.342 9578	308.2	2.29	3.99	21 26.4	
	9	6 35	53.60	7.200	23 44	43.6	4.36	0.342 2126	312.8	2.30	4.00	21 25.3	
	10	6 38	46.23	+7.186	+23 42	53.2	-4.84	0.341 4561	-317.6	2.30	4.01	21 24.2	
	11	6 41	38.52	7.172	23 40	51.4	5.31	0.340 6881	322.4	2.31	4.02	21 23.1	
	12	6 44	30.46	7.157	23 38	38.3	5.78	0.339 9085	327.3	2.31	4.02	21 22.1	
	13	6 47	22.04	7.141	23 36	13.9	6.25	0.339 1170	332.2	2.31	4.03	21 21.0	
	14	6 50	13.24	7.126	23 33	38.4	6.71	0.338 3137	337.2	2.32	4.04	21 19.9	
	15	6 53	4.07	+7.110	+23 30	51.8	-7.17	0.337 4984	-342.2	2.32	4.05	21 18.8	
	16	6 55	54.50	+7.093	+23 27	54.3	-7.62	0.336 6710	-347.3	2.32	4.05	21 17.7	

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi- diam- eter.	Hor. Paral- lax.	Transit. Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Aug. 16	6 55 54.50	+7.093	+23 27 54.3	- 7.62	0.336 6710	-347.3	2.32	4.05	21 17.7
17	6 58 44.53	7.070	23 24 45.9	8.07	0.335 8315	352.3	2.33	4.06	21 16.6
18	7 1 34.15	7.050	23 21 26.8	8.52	0.334 9798	357.4	2.34	4.07	21 15.4
19	7 4 23.36	7.042	23 17 57.0	8.96	0.334 1159	362.5	2.34	4.08	21 14.3
20	7 7 12.14	7.024	23 14 16.6	9.40	0.333 2396	367.7	2.34	4.08	21 13.2
21	7 10 0.48	+7.005	+23 10 25.9	- 9.83	0.332 3509	-372.9	2.35	4.09	21 12.0
22	7 12 48.38	6.987	23 6 24.9	10.26	0.331 4497	378.1	2.35	4.10	21 10.9
23	7 15 35.84	6.968	23 2 13.6	10.68	0.330 5361	383.3	2.36	4.11	21 9.7
24	7 18 22.83	6.949	22 57 52.3	11.10	0.329 6099	388.5	2.36	4.12	21 8.6
25	7 21 9.37	6.929	22 53 21.0	11.51	0.328 6712	393.8	2.37	4.13	21 7.4
26	7 23 55.44	+6.910	+22 48 39.8	-11.92	0.327 7198	-399.1	2.38	4.14	21 6.2
27	7 26 41.04	6.890	22 43 48.8	12.33	0.326 7557	404.3	2.38	4.15	21 5.0
28	7 29 26.17	6.870	22 38 48.1	12.73	0.325 7789	409.7	2.39	4.16	21 3.8
29	7 32 10.81	6.850	22 33 37.9	13.12	0.324 7892	415.1	2.39	4.17	21 2.6
30	7 34 54.98	6.830	22 28 18.2	13.51	0.323 7866	420.5	2.40	4.18	21 1.4
31	7 37 38.66	+6.810	+22 22 49.2	-13.90	0.322 7709	-426.0	2.40	4.18	21 0.2
Sept. 1	7 40 21.85	6.789	22 17 11.0	14.28	0.321 7419	431.5	2.41	4.19	20 59.0
2	7 43 4.55	6.769	22 11 23.6	14.66	0.320 6996	437.1	2.41	4.20	20 57.7
3	7 45 46.76	6.749	22 5 27.2	15.03	0.319 6438	442.8	2.42	4.21	20 56.4
4	7 48 28.48	6.728	21 59 22.0	15.40	0.318 5742	448.5	2.43	4.23	20 55.2
5	7 51 9.69	+6.707	+21 53 8.0	-15.76	0.317 4907	-454.4	2.43	4.24	20 54.0
6	7 53 50.40	6.686	21 46 45.4	16.12	0.316 3930	460.3	2.44	4.25	20 52.7
7	7 56 30.60	6.664	21 40 14.3	16.47	0.315 2811	466.3	2.45	4.26	20 51.4
8	7 59 10.29	6.643	21 33 34.8	16.82	0.314 1547	472.4	2.45	4.27	20 50.1
9	8 1 49.45	6.621	21 26 47.0	17.16	0.313 0137	478.5	2.46	4.28	20 48.8
10	8 4 28.08	+6.599	+21 19 51.2	-17.49	0.311 8579	-484.7	2.46	4.29	20 47.5
11	8 7 6.18	6.576	21 12 47.4	17.82	0.310 6871	491.0	2.47	4.30	20 46.2
12	8 9 43.74	6.554	21 5 35.8	18.14	0.309 5013	497.2	2.47	4.31	20 44.9
13	8 12 20.76	6.531	20 58 16.5	18.46	0.308 3004	503.6	2.49	4.33	20 43.6
14	8 14 57.23	6.508	20 50 49.7	18.77	0.307 0842	510.0	2.49	4.34	20 42.2
15	8 17 33.14	+6.485	+20 43 15.5	-19.08	0.305 8526	-516.4	2.50	4.35	20 40.9
16	8 20 8.50	6.461	20 35 34.0	19.38	0.304 6056	522.8	2.50	4.36	20 39.5
17	8 22 43.30	6.438	20 27 45.4	19.67	0.303 3430	529.3	2.51	4.38	20 38.1
18	8 25 17.53	6.415	20 19 49.8	19.96	0.302 0648	535.9	2.52	4.39	20 36.8
19	8 27 51.21	6.391	20 11 47.4	20.24	0.300 7708	542.5	2.53	4.40	20 35.4
20	8 30 24.29	+6.367	+20 3 38.3*	-20.52	0.299 4610	-549.0	2.54	4.42	20 34.0
21	8 32 56.80	6.343	19 55 22.6	20.79	0.298 1354	555.6	2.54	4.43	20 32.6
22	8 35 28.74	6.319	19 47 0.6	21.05	0.296 7940	562.2	2.55	4.44	20 31.2
23	8 38 0.10	6.294	19 38 32.3	21.31	0.295 4367	568.9	2.56	4.46	20 29.7
24	8 40 30.87	6.270	19 29 57.8	21.57	0.294 0634	575.6	2.57	4.47	20 28.3
25	8 43 1.07	+6.246	+19 21 17.2	-21.81	0.292 6740	-582.3	2.58	4.49	20 26.9
26	8 45 30.68	6.222	19 12 30.8	22.05	0.291 2685	589.0	2.58	4.50	20 25.4
27	8 47 59.72	6.198	19 3 38.6	22.29	0.289 8467	595.8	2.59	4.51	20 23.9
28	8 50 28.18	6.174	18 54 40.8	22.53	0.288 4085	602.7	2.60	4.53	20 22.5
29	8 52 56.07	6.150	18 45 37.4	22.76	0.286 9537	609.6	2.61	4.54	20 21.0
30	8 55 23.37	+6.126	+18 36 28.6	-22.98	0.285 4823	-616.6	2.62	4.56	20 19.5
Oct. 1	8 57 50.10	+6.102	+18 27 14.6	-23.19	0.283 9940	-623.6	2.63	4.58	20 18.0



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	h	m	s		°	'	"						
Oct. 1	8	57	50.10	+6.102	+18	27	14.6	-23.19	0.283 9940	-623.6	2.63	4.58	20 18.0
2	9	0	16.25	6.078	18	17	55.4	23.40	0.282 4887	630.8	2.63	4.59	20 16.4
3	9	2	41.82	6.054	18	8	31.2	23.61	0.280 9660	638.1	2.65	4.61	20 14.9
4	9	5	6.82	6.030	17	59	2.2	23.81	0.279 4257	645.5	2.65	4.62	20 13.4
5	9	7	31.24	6.006	17	49	28.5	24.00	0.277 8677	652.9	2.66	4.64	20 11.9
6	9	9	55.08	+5.981	+17	39	50.2	-24.19	0.276 2917	-660.4	2.67	4.66	20 10.3
7	9	12	18.33	5.957	17	30	7.6	24.37	0.274 6975	668.1	2.69	4.68	20 8.7
8	9	14	40.99	5.932	17	20	20.7	24.54	0.273 0850	675.7	2.69	4.69	20 7.2
9	9	17	3.06	5.907	17	10	29.7	24.71	0.271 4540	683.5	2.70	4.71	20 5.6
10	9	19	24.54	5.882	17	0	34.8	24.87	0.269 8043	691.3	2.72	4.73	20 4.0
11	9	21	45.42	+5.857	+16	50	36.0	-25.02	0.268 1358	-699.1	2.73	4.75	20 2.4
12	9	24	5.69	5.832	16	40	33.7	25.17	0.266 4484	707.0	2.73	4.76	20 0.8
13	9	26	25.37	5.807	16	30	27.8	25.32	0.264 7420	715.0	2.74	4.78	19 59.2
14	9	28	44.44	5.782	16	20	18.6	25.45	0.263 0164	723.0	2.76	4.80	19 57.5
15	9	31	2.90	5.756	16	10	6.2	25.58	0.261 2715	731.1	2.77	4.82	19 55.9
16	9	33	20.74	+5.731	+15	59	50.8	-25.70	0.259 5072	-739.2	2.78	4.84	19 54.2
17	9	35	37.97	5.705	15	49	32.6	25.82	0.257 7233	747.4	2.79	4.86	19 52.6
18	9	37	54.57	5.679	15	39	11.6	25.93	0.255 9199	755.5	2.80	4.88	19 50.9
19	9	40	10.55	5.653	15	28	48.1	26.03	0.254 0969	763.7	2.81	4.90	19 49.2
20	9	42	25.91	5.627	15	18	22.2	26.13	0.252 2541	771.9	2.82	4.92	19 47.5
21	9	44	40.65	+5.601	+15	7	54.0	-26.22	0.250 3916	-780.2	2.84	4.94	19 45.8
22	9	46	54.76	5.575	14	57	23.6	26.31	0.248 5093	788.5	2.85	4.96	19 44.1
23	9	49	8.26	5.549	14	46	51.2	26.39	0.246 6070	796.8	2.86	4.99	19 42.4
24	9	51	21.13	5.523	14	36	16.8	26.47	0.244 6848	805.1	2.88	5.01	19 40.7
25	9	53	33.37	5.497	14	25	40.7	26.54	0.242 7426	813.5	2.89	5.03	19 38.9
26	9	55	44.99	+5.471	+14	15	2.9	-26.61	0.240 7801	-822.0	2.90	5.05	19 37.2
27	9	57	55.99	5.445	14	4	23.6	26.67	0.238 7972	830.5	2.92	5.08	19 35.4
28	10	0	6.36	5.419	13	53	43.0	26.72	0.236 7937	839.1	2.93	5.10	19 33.6
29	10	2	16.11	5.393	13	43	1.1	26.77	0.234 7695	847.8	2.94	5.12	19 31.8
30	10	4	25.24	5.367	13	32	18.2	26.81	0.232 7243	856.6	2.96	5.15	19 30.0
31	10	6	33.74	+5.341	+13	21	34.2	-26.85	0.230 6578	-865.5	2.97	5.17	19 28.2
Nov. 1	10	8	41.62	5.315	13	10	49.4	26.88	0.228 5699	874.5	2.98	5.20	19 26.4
2	10	10	48.87	5.289	13	0	4.0	26.90	0.226 4602	883.6	3.00	5.22	19 24.6
3	10	12	55.49	5.263	12	49	18.0	26.92	0.224 3286	892.8	3.01	5.25	19 22.7
4	10	15	1.47	5.236	12	38	31.7	26.94	0.222 1749	902.0	3.03	5.28	19 20.9
5	10	17	6.80	+5.209	+12	27	45.1	-26.94	0.219 9988	-911.4	3.04	5.30	19 19.0
6	10	19	11.49	5.182	12	16	58.5	26.94	0.217 8002	920.8	3.06	5.33	19 17.2
7	10	21	15.53	5.154	12	6	12.0	26.93	0.215 5789	930.3	3.08	5.36	19 15.3
8	10	23	18.90	5.127	11	55	25.9	26.91	0.213 3347	939.9	3.09	5.38	19 13.4
9	10	25	21.61	5.099	11	44	40.2	26.89	0.211 0674	949.6	3.11	5.41	19 11.5
10	10	27	23.65	+5.071	+11	33	55.2	-26.86	0.208 7768	-959.3	3.12	5.44	19 9.6
11	10	29	25.01	5.043	11	23	10.9	26.83	0.206 4629	969.0	3.14	5.47	19 7.6
12	10	31	25.69	5.014	11	12	27.5	26.78	0.204 1255	978.8	3.16	5.50	19 5.7
13	10	33	25.66	4.984	11	1	45.3	26.73	0.201 7645	988.7	3.17	5.53	19 3.7
14	10	35	24.94	4.955	10	51	4.3	26.68	0.199 3798	998.5	3.19	5.56	19 1.8
15	10	37	23.51	+4.925	+10	40	24.8	-26.62	0.196 9715	-1008.4	3.21	5.59	18 59.8
16	10	39	21.36	+4.895	+10	29	46.9	-26.55	0.194 5394	-1018.3	3.23	5.62	18 57.8



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.	
	Noon.				Noon.									
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	h	m
Nov. 16	10	39	21.36	+4.895	+10	29	46.9	-26.55	0.194 5394	-1018.3	3.23	5.62	18	57.8
17	10	41	18.49	4.865	10	19	10.7	26.47	0.192 0835	1028.2	3.24	5.65	18	55.8
18	10	43	14.90	4.835	10	8	36.4	26.39	0.189 6038	1038.2	3.27	5.69	18	53.8
19	10	45	10.59	4.805	9	58	4.1	26.30	0.187 1002	1048.2	3.28	5.72	18	51.8
20	10	47	5.83	4.774	9	47	33.9	26.21	0.184 5726	1058.1	3.30	5.75	18	49.8
21	10	48	59.73	+4.743	+ 9	37	6.1	-26.11	0.182 0211	-1068.1	3.32	5.79	18	47.7
22	10	50	53.18	4.712	9	26	40.7	26.00	0.179 4455	1078.2	3.34	5.82	18	45.7
23	10	52	45.87	4.680	9	16	18.0	25.89	0.176 8457	1088.3	3.36	5.86	18	43.6
24	10	54	37.81	4.648	9	5	57.9	25.78	0.174 2215	1098.5	3.38	5.89	18	41.5
25	10	56	28.98	4.616	8	55	40.7	25.66	0.171 5729	1108.7	3.40	5.93	18	39.4
26	10	58	19.39	+4.584	+ 8	45	26.5	-25.52	0.168 8996	-1119.1	3.42	5.96	18	37.3
27	11	0	9.02	4.552	8	35	15.6	25.39	0.166 2013	1129.5	3.44	6.00	18	35.2
28	11	1	57.86	4.519	8	25	7.9	25.25	0.163 4781	1139.9	3.47	6.04	18	33.0
29	11	3	45.91	4.486	8	15	3.7	25.10	0.160 7296	1150.5	3.49	6.08	18	30.9
30	11	5	33.16	4.452	8	5	3.1	24.95	0.157 9557	1161.1	3.51	6.12	18	28.7
Dec. 1	11	7	19.59	+4.418	+ 7	55	6.3	-24.79	0.155 1561	-1171.9	3.54	6.16	18	26.5
2	11	9	5.20	4.383	7	45	13.4	24.62	0.152 3307	1182.6	3.56	6.20	18	24.4
3	11	10	49.96	4.348	7	35	24.8	24.44	0.149 4793	1193.5	3.58	6.24	18	22.2
4	11	12	33.88	4.312	7	25	40.5	24.25	0.146 6016	1204.5	3.60	6.28	18	19.9
5	11	14	16.92	4.275	7	16	0.8	24.06	0.143 6975	1215.6	3.63	6.32	18	17.7
6	11	15	59.09	+4.238	+ 7	6	25.8	-23.86	0.140 7669	-1226.6	3.65	6.36	18	15.5
7	11	17	40.35	4.200	6	56	55.8	23.64	0.137 8097	1237.7	3.68	6.41	18	13.2
8	11	19	20.70	4.162	6	47	30.9	23.42	0.134 8259	1248.8	3.70	6.45	18	10.9
9	11	21	0.11	4.123	6	38	11.3	23.20	0.131 8153	1260.0	3.73	6.50	18	8.6
10	11	22	38.58	4.083	6	28	57.3	22.97	0.128 7781	1271.1	3.75	6.54	18	6.3
11	11	24	16.07	+4.042	+ 6	19	48.9	-22.73	0.125 7142	-1282.2	3.78	6.59	18	4.0
12	11	25	52.58	4.000	6	10	46.4	22.48	0.122 6236	1293.3	3.81	6.63	18	1.7
13	11	27	28.08	3.958	6	1	49.9	22.22	0.119 5064	1304.4	3.83	6.68	17	59.3
14	11	29	2.55	3.915	5	52	59.7	21.96	0.116 3626	1315.4	3.86	6.73	17	56.9
15	11	30	35.98	3.871	5	44	16.0	21.68	0.113 1924	1326.4	3.89	6.78	17	54.5
16	11	32	8.34	+3.826	+ 5	35	38.9	-21.40	0.109 9959	-1337.3	3.92	6.83	17	52.1
17	11	33	39.63	3.781	5	27	8.6	21.12	0.106 7732	1348.2	3.95	6.88	17	49.7
18	11	35	9.81	3.734	5	18	45.3	20.82	0.103 5244	1359.1	3.98	6.93	17	47.2
19	11	36	38.88	3.688	5	10	29.1	20.52	0.100 2497	1369.8	4.01	6.99	17	44.8
20	11	38	6.81	3.640	5	2	20.2	20.21	0.096 9493	1380.5	4.04	7.04	17	42.3
21	11	39	33.60	+3.592	+ 4	54	18.9	-19.90	0.093 6232	-1391.2	4.07	7.09	17	39.8
22	11	40	59.21	3.542	4	46	25.1	19.58	0.090 2715	1401.9	4.10	7.15	17	37.2
23	11	42	23.63	3.492	4	38	39.2	19.25	0.086 8943	1412.5	4.13	7.20	17	34.7
24	11	43	46.84	3.442	4	31	1.2	18.91	0.083 4917	1423.0	4.17	7.26	17	32.1
25	11	45	8.82	3.390	4	23	31.4	18.57	0.080 0638	1433.6	4.20	7.32	17	29.5
26	11	46	29.55	+3.337	+ 4	16	9.9	-18.22	0.076 6105	-1444.2	4.24	7.38	17	26.9
27	11	47	48.99	3.283	4	8	57.1	17.85	0.073 1319	1454.7	4.27	7.44	17	24.3
28	11	49	7.14	3.228	4	1	53.0	17.48	0.069 6282	1465.1	4.30	7.50	17	21.7
29	11	50	23.95	3.172	3	54	57.9	17.10	0.066 0993	1475.6	4.34	7.56	17	19.0
30	11	51	39.41	3.115	3	48	12.1	16.71	0.062 5455	1485.9	4.37	7.62	17	16.3
31	11	52	53.47	+3.056	+ 3	41	35.7	-16.31	0.058 9668	-1496.3	4.41	7.68	17	13.6
32	11	54	6.11	...	+ 3	35	9.1	...	0.055 3635	...	4.45	7.75	17	10.8

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		" " "	" "	"	" " "	"		
Jan.	1	302 56 43.4	37 8.1	+28.5	-1 46 44.3	-19.8	0.145 9131	-2120
	3	304 11 4.0	37 12.4	26.5	1 47 22.4	18.3	0.145 4963	2047
	5	305 25 33.1	37 16.6	24.4	1 47 57.5	16.8	0.145 0942	1973
	7	306 40 10.3	37 20.6	22.3	1 48 29.7	15.3	0.144 7071	1897
	9	307 54 55.3	37 24.5	20.1	1 48 58.9	13.8	0.144 3353	1821
	11	309 9 48.0	37 28.2	+17.9	-1 49 25.0	-12.3	0.143 9789	-1743
	13	310 24 47.9	37 31.7	15.7	1 49 48.0	10.8	0.143 6383	1663
	15	311 39 54.7	37 35.1	13.5	1 50 8.0	9.2	0.143 3136	1583
	17	312 55 8.1	37 38.3	11.2	1 50 24.8	7.6	0.143 0051	1502
	19	314 10 27.8	37 41.4	8.9	1 50 38.5	6.0	0.142 7129	1419
	21	315 25 53.4	37 44.3	+ 6.5	-1 50 48.9	- 4.4	0.142 4374	-1336
	23	316 41 24.7	37 47.0	4.2	1 50 56.2	2.9	0.142 1786	1252
	25	317 57 1.1	37 49.5	+ 1.8	1 51 0.3	- 1.3	0.141 9367	1167
	27	319 12 42.5	37 51.8	- 0.5	1 51 1.2	+ 0.4	0.141 7119	1081
	29	320 28 28.3	37 54.0	2.9	1 50 58.8	2.0	0.141 5043	995
	31	321 44 18.3	37 56.0	- 5.3	-1 50 53.2	+ 3.6	0.141 3141	- 907
Feb.	2	323 0 12.1	37 57.8	7.6	1 50 44.4	5.2	0.141 1414	820
	4	324 16 9.3	37 59.4	10.0	1 50 32.3	6.9	0.140 9863	731
	6	325 32 9.6	38 0.8	12.3	1 50 16.9	8.5	0.140 8490	642
	8	326 48 12.5	38 2.1	14.6	1 49 58.4	10.1	0.140 7296	553
	10	328 4 17.8	38 3.1	-16.9	-1 49 36.6	+11.7	0.140 6280	- 463
	12	329 20 24.9	38 4.0	19.1	1 49 11.6	13.3	0.140 5445	372
	14	330 36 33.6	38 4.7	21.3	1 48 43.3	14.9	0.140 4790	282
	16	331 52 43.5	38 5.2	23.5	1 48 11.8	16.5	0.140 4316	192
	18	333 8 54.1	38 5.4	25.6	1 47 37.1	18.1	0.140 4023	101
	20	334 25 5.1	38 5.5	-27.7	-1 46 59.3	+19.7	0.140 3912	- 16
	22	335 41 16.0	38 5.4	29.7	1 46 18.3	21.3	0.140 3982	+ 81
	24	336 57 26.6	38 5.1	31.7	1 45 34.2	22.8	0.140 4235	172
	26	338 13 36.4	38 4.6	33.6	1 44 46.9	24.4	0.140 4668	262
	28	339 29 45.0	38 4.0	35.4	1 43 56.6	25.9	0.140 5282	352
Mar.	2	340 45 52.1	38 3.1	-37.1	-1 43 3.3	+27.4	0.140 6077	+ 443
	4	342 1 57.3	38 2.0	38.8	1 42 6.9	28.9	0.140 7052	532
	6	343 18 0.1	38 0.8	40.4	1 41 7.6	30.4	0.140 8206	622
	8	344 34 0.3	37 59.3	42.0	1 40 5.4	31.8	0.140 9540	711
	10	345 49 57.3	37 57.7	43.4	1 39 0.3	33.3	0.141 1051	800
	12	347 5 51.0	37 55.9	-44.8	-1 37 52.3	+34.7	0.141 2738	+ 887
	14	348 21 40.8	37 53.9	46.0	1 36 41.5	36.1	0.141 4600	975
	16	349 37 26.5	37 51.8	47.2	1 35 28.0	37.4	0.141 6637	1062
	18	350 53 7.7	37 49.4	48.3	1 34 11.8	38.8	0.141 8847	1148
	20	352 8 43.9	37 46.8	49.3	1 32 52.9	40.1	0.142 1228	1233
	22	353 24 11.9	37 44.1	-50.2	-1 31 31.4	+41.4	0.142 3779	+1317
	24	354 39 40.3	37 41.2	51.0	1 30 7.4	42.6	0.142 6497	1401
	26	355 54 59.8	37 38.2	51.7	1 28 40.9	43.9	0.142 9382	1484
	28	357 10 13.1	37 35.0	52.3	1 27 11.9	45.1	0.143 2431	1565
	30	358 25 19.7	37 31.6	52.8	1 25 40.6	46.3	0.143 5642	1646
Apr.	1	359 40 19.4	37 28.0	-53.2	-1 24 6.9	+47.4	0.143 9014	+1725
	3	0 55 11.8	37 24.3	-53.5	-1 22 31.1	+48.4	0.144 2543	+1804

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	" "	"	° ' "	"		
Apr.	1	359 40 19.4	37 28.0	-53.2	-1 24 6.9	+47.4	0.143 9014	+1725
	3	0 55 11.8	37 24.3	53.5	1 22 31.1	48.4	0.144 2543	1804
	5	2 9 56.7	37 20.5	53.7	1 20 53.1	49.5	0.144 6228	1881
	7	3 24 33.8	37 16.5	53.8	1 19 12.9	50.6	0.145 0066	1957
	9	4 39 2.7	37 12.4	53.8	1 17 30.7	51.6	0.145 4054	2031
	11	5 53 23.2	37 8.1	-53.6	-1 15 46.6	+52.6	0.145 8191	+2103
	13	7 7 34.9	37 3.6	53.4	1 14 0.4	53.6	0.146 2473	2177
	15	8 21 37.6	36 59.0	53.1	1 12 12.4	54.5	0.146 6897	2247
	17	9 35 31.0	36 54.3	52.7	1 10 22.6	55.3	0.147 1462	2317
	19	10 49 14.9	36 49.5	52.2	1 8 31.2	56.1	0.147 6164	2385
	21	12 2 49.0	36 44.5	-51.6	-1 6 38.1	+57.0	0.148 1000	+2451
	23	13 16 13.0	36 39.5	51.0	1 4 43.4	57.7	0.148 5967	2516
	25	14 29 26.8	36 34.3	50.2	1 2 47.2	58.5	0.149 1062	2579
	27	15 42 30.1	36 29.0	49.3	1 0 49.6	59.1	0.149 6283	2641
	29	16 55 22.7	36 23.6	48.3	0 58 50.7	59.8	0.150 1625	2701
May	1	18 8 4.3	36 18.0	-47.3	-0 56 50.5	+60.4	0.150 7086	+2760
	3	19 20 34.7	36 12.4	46.2	0 54 49.1	61.0	0.151 2663	2817
	5	20 32 53.8	36 6.7	45.0	0 52 46.5	61.6	0.151 8353	2872
	7	21 45 1.3	36 0.8	43.7	0 50 42.8	62.1	0.152 4151	2926
	9	22 56 57.0	35 54.9	42.4	0 48 38.1	62.6	0.153 0056	2979
	11	24 8 41.0	35 49.0	-40.9	-0 46 32.5	+63.0	0.153 6064	+3029
	13	25 20 12.9	35 42.9	39.4	0 44 26.1	63.4	0.154 2170	3077
	15	26 31 32.5	35 36.7	37.9	0 42 18.8	63.8	0.154 8372	3124
	17	27 42 39.8	35 30.6	36.3	0 40 10.8	64.2	0.155 4667	3170
	19	28 53 34.7	35 24.3	34.6	0 38 2.2	64.5	0.156 1051	3214
	21	30 4 16.8	35 17.9	-32.9	-0 35 53.0	+64.7	0.156 7520	+3256
	23	31 14 46.3	35 11.5	31.1	0 33 43.3	65.0	0.157 4072	3296
	25	32 25 2.9	35 5.1	29.3	0 31 33.1	65.2	0.158 0703	3335
	27	33 35 6.5	34 58.5	27.4	0 29 22.5	65.4	0.158 7409	3372
	29	34 44 57.0	34 52.0	25.5	0 27 11.6	65.5	0.159 4188	3407
	31	35 54 34.4	34 45.4	-23.6	-0 25 0.4	+65.6	0.160 1035	+3440
June	2	37 3 58.4	34 38.7	21.6	0 22 49.1	65.7	0.160 7947	3472
	4	38 13 9.2	34 32.1	19.6	0 20 37.6	65.8	0.161 4922	3502
	6	39 22 6.6	34 25.3	17.6	0 18 26.1	65.8	0.162 1955	3531
	8	40 30 50.5	34 18.6	15.6	0 16 14.5	65.8	0.162 9044	3558
	10	41 39 21.0	34 11.8	-13.5	-0 14 2.9	+65.8	0.163 6184	+3583
	12	42 47 37.8	34 5.0	11.4	0 11 51.5	65.7	0.164 3373	3606
	14	43 55 41.0	33 58.2	9.3	0 9 40.2	65.6	0.165 0607	3628
	16	45 3 30.7	33 51.4	7.2	0 7 29.1	65.5	0.165 7883	3648
	18	46 11 6.6	33 44.5	5.1	0 5 18.3	65.3	0.166 5198	3667
	20	47 18 28.9	33 37.7	-3.0	-0 3 7.8	+65.2	0.167 2549	+3684
	22	48 25 37.5	33 30.9	-0.9	-0 0 57.7	64.9	0.167 9932	3699
	24	49 32 32.4	33 24.0	+1.1	+0 1 11.9	64.7	0.168 7345	3713
	26	50 39 13.6	33 17.2	3.2	0 3 21.2	64.5	0.169 4783	3725
	28	51 45 41.1	33 10.3	5.3	0 5 29.9	64.2	0.170 2245	3736
	30	52 51 54.8	33 3.5	+7.4	+0 7 38.0	+63.9	0.170 9728	+3746
July	2	53 57 55.0	32 56.6	+9.4	+0 9 45.6	+63.6	0.171 7227	+3753

## FOR GREENWICH MEAN NOON.

Data.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	' "	"	° ' "	"		
July	2	53 57 55.0	32 56.6	+ 9.4	+0 9 45.6	+63.6	0.171 7227	+3753
	4	55 3 41.4	32 49.8	11.4	0 11 52.4	63.2	0.172 4740	3760
	6	56 9 14.3	32 43.0	13.4	0 13 58.6	62.9	0.173 2265	3765
	8	57 14 33.5	32 36.2	15.4	0 16 4.0	62.5	0.173 9797	3768
	10	58 19 39.2	32 29.5	17.3	0 18 8.7	62.1	0.174 7336	3770
	12	59 24 31.4	32 22.7	+19.2	+0 20 12.5	+61.7	0.175 4877	+3771
	14	60 29 10.2	32 16.0	21.1	0 22 15.5	61.2	0.176 2418	3770
	16	61 33 35.5	32 9.3	23.0	0 24 17.5	60.8	0.176 9956	3768
	18	62 37 47.5	32 2.6	24.8	0 26 18.7	60.3	0.177 7488	3764
	20	63 41 46.1	31 56.0	26.5	0 28 18.9	59.9	0.178 5013	3760
	22	64 45 31.4	31 49.4	+28.2	+0 30 18.1	+59.3	0.179 2527	+3754
	24	65 49 3.7	31 42.8	29.9	0 32 16.2	58.8	0.180 0027	3746
	26	66 52 22.8	31 36.3	31.5	0 34 13.3	58.3	0.180 7511	3738
	28	67 55 29.0	31 29.8	33.1	0 36 9.3	57.7	0.181 4978	3728
	30	68 58 22.2	31 23.4	34.6	0 38 4.1	57.1	0.182 2423	3717
Aug.	1	70 1 2.6	31 17.0	+36.1	+0 39 57.8	+56.6	0.182 9846	+3705
	3	71 3 30.2	31 10.6	37.6	0 41 50.3	56.0	0.183 7244	3692
	5	72 5 45.1	31 4.3	38.9	0 43 41.6	55.4	0.184 4613	3677
	7	73 7 47.4	30 58.0	40.2	0 45 31.7	54.8	0.185 1953	3662
	9	74 9 37.3	30 51.8	41.5	0 47 20.6	54.1	0.185 9260	3645
	11	75 11 14.7	30 45.7	+42.7	+0 49 8.2	+53.5	0.186 6533	+3628
	13	76 12 40.0	30 39.6	43.8	0 50 54.5	52.8	0.187 3770	3609
	15	77 13 53.0	30 33.5	44.9	0 52 39.4	52.1	0.188 0968	3589
	17	78 14 53.9	30 27.5	45.9	0 54 23.0	51.5	0.188 8126	3568
	19	79 15 42.9	30 21.6	46.9	0 56 5.2	50.8	0.189 5241	3546
	21	80 16 20.1	30 15.6	+47.8	+0 57 46.0	+50.1	0.190 2312	+3524
	23	81 16 45.4	30 9.8	48.6	0 59 25.5	49.4	0.190 9337	3500
	25	82 16 59.3	30 4.0	49.4	1 1 3.5	48.7	0.191 6313	3476
Sept.	27	83 17 1.6	29 58.3	50.1	1 2 40.1	48.0	0.192 3240	3451
	29	84 16 52.5	29 52.6	50.8	1 4 15.3	47.2	0.193 0116	3425
	31	85 16 32.2	29 47.1	+51.4	+1 5 49.0	+46.5	0.193 6938	+3397
	2	86 16 0.8	29 41.5	51.9	1 7 21.2	45.7	0.194 3704	3369
	4	87 15 18.4	29 36.1	52.3	1 8 51.9	45.0	0.195 0414	3340
	6	88 14 25.1	29 30.7	52.7	1 10 21.1	44.2	0.195 7065	3311
	8	89 13 21.1	29 25.3	53.1	1 11 48.8	43.5	0.196 3657	3281
	10	90 12 6.4	29 20.0	+53.3	+1 13 15.0	+42.7	0.197 0187	+3249
	12	91 10 41.3	29 14.9	53.5	1 14 39.7	41.9	0.197 6654	3218
	14	92 9 5.9	29 9.7	53.7	1 16 2.7	41.2	0.198 3057	3185
	16	93 7 20.2	29 4.6	53.8	1 17 24.3	40.4	0.198 9394	3152
	18	94 5 24.5	28 59.6	53.8	1 18 44.3	39.6	0.199 5663	3118
	20	95 3 18.8	28 54.7	+53.7	+1 20 2.7	+38.8	0.200 1865	+3083
	22	96 1 3.3	28 49.8	53.6	1 21 19.6	38.0	0.200 7996	3048
	24	96 58 38.2	28 45.1	53.5	1 22 34.8	37.2	0.201 4057	3012
Oct.	26	97 56 3.6	28 40.3	53.3	1 23 48.5	36.4	0.202 0044	2976
	28	98 53 19.6	28 35.7	53.0	1 25 0.5	35.6	0.202 5959	2939
	30	99 50 26.3	28 31.1	+52.6	+1 26 10.9	+34.8	0.203 1799	+2901
	2	100 47 24.0	28 26.6	+52.2	+1 27 19.8	+34.0	0.203 7563	+2863

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	" "	"	° ' "	"		
ct.	2	100 47 24.0	28 26.6	+52.2	+1 27 19.8	+34.0	0.203 7563	+2863
	4	101 44 12.8	28 22.2	51.8	1 28 27.1	33.2	0.204 3251	2824
	6	102 40 52.7	28 17.8	51.3	1 29 32.7	32.4	0.204 8859	2785
	8	103 37 24.0	28 13.5	50.7	1 30 36.7	31.6	0.205 4389	2745
	10	104 33 46.8	28 9.3	50.1	1 31 39.0	30.8	0.205 9839	2705
	12	105 30 1.2	28 5.1	+49.4	+1 32 39.7	+29.9	0.206 5207	+2664
	14	106 26 7.4	28 1.1	48.7	1 33 38.7	29.1	0.207 0494	2623
	16	107 22 5.5	27 57.1	48.0	1 34 36.2	28.3	0.207 5697	2581
	18	108 17 55.7	27 53.1	47.2	1 35 32.0	27.5	0.208 0817	2539
	20	109 13 38.1	27 49.3	46.3	1 36 26.2	26.7	0.208 5851	2496
	22	110 9 12.9	27 45.5	+45.4	+1 37 18.8	+25.9	0.209 0801	+2453
	24	111 4 40.1	27 41.8	44.4	1 38 9.8	25.1	0.209 5663	2409
	26	112 0 0.1	27 38.2	43.4	1 38 59.1	24.2	0.210 0438	2365
	28	112 55 12.9	27 34.6	42.4	1 39 46.7	23.4	0.210 5125	2322
	30	113 50 18.7	27 31.2	41.3	1 40 32.7	22.6	0.210 9724	2277
iov.	1	114 45 17.6	27 27.7	+40.2	+1 41 17.1	+21.8	0.211 4233	+2232
	3	115 40 9.7	27 24.4	39.0	1 41 59.9	21.0	0.211 8651	2187
	5	116 34 55.3	27 21.2	37.8	1 42 40.9	20.1	0.212 2979	2141
	7	117 29 34.4	27 18.0	36.6	1 43 20.4	19.3	0.212 7215	2095
	9	118 24 7.2	27 14.9	35.3	1 43 58.2	18.5	0.213 1359	2049
	11	119 18 33.9	27 11.9	+34.0	+1 44 34.4	+17.7	0.213 5410	+2002
	13	120 12 54.7	27 8.9	32.7	1 45 9.0	16.9	0.213 9368	1955
	15	121 7 9.5	27 6.0	31.3	1 45 41.9	16.0	0.214 3232	1908
	17	122 1 18.7	27 3.2	29.9	1 46 13.1	15.2	0.214 7001	1861
	19	122 55 22.4	27 0.5	28.5	1 46 42.7	14.4	0.215 0675	1813
	21	123 49 20.7	26 57.8	+27.0	+1 47 10.7	+13.6	0.215 4254	+1765
	23	124 43 13.7	26 55.2	25.6	1 47 37.1	12.8	0.215 7737	1717
	25	125 37 1.7	26 52.7	24.1	1 48 1.8	12.0	0.216 1123	1669
	27	126 30 44.6	26 50.2	22.6	1 48 25.0	11.2	0.216 4412	1620
	29	127 24 22.8	26 48.0	21.1	1 48 46.6	10.4	0.216 7602	1571
Dec.	1	128 17 56.5	26 45.7	+19.5	+1 49 6.4	+ 9.5	0.217 0696	+1522
	3	129 11 25.6	26 43.5	17.9	1 49 24.7	8.8	0.217 3691	1473
	5	130 4 50.4	26 41.3	16.3	1 49 41.4	8.0	0.217 6587	1423
	7	130 58 11.0	26 39.3	14.7	1 49 56.5	7.2	0.217 9384	1374
	9	131 51 27.6	26 37.3	13.1	1 50 10.0	6.4	0.218 2082	1324
	11	132 44 40.2	26 35.4	+11.5	+1 50 21.9	+ 5.6	0.218 4681	+1274
	13	133 37 49.1	26 33.6	9.9	1 50 32.2	4.8	0.218 7178	1224
	15	134 30 54.5	26 31.8	8.2	1 50 40.9	4.0	0.218 9576	1174
	17	135 23 56.4	26 30.1	6.6	1 50 48.0	3.2	0.219 1873	1123
	19	136 16 55.0	26 28.5	5.0	1 50 53.5	2.4	0.219 4069	1073
	21	137 9 50.5	26 27.0	+ 3.3	+1 50 57.5	+ 1.6	0.219 6164	+1022
	23	138 2 43.0	26 25.5	+ 1.6	1 50 59.9	+ 0.8	0.219 8157	971
	25	138 55 32.7	26 24.2	0.0	1 51 0.7	0.0	0.220 0048	920
	27	139 48 19.7	26 22.9	- 1.6	1 50 59.8	- 0.8	0.220 1838	869
	29	140 41 4.2	26 21.6	3.3	1 50 57.5	1.6	0.220 3525	818
	31	141 33 46.3	26 20.5	- 4.9	+1 50 53.5	- 2.4	0.220 5110	+ 767
	33	142 26 26.1	26 19.4	- 6.6	+1 50 48.1	- 3.1	0.220 6592	+ 715

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	Noon.
	h	m	s	s	°	'	"	"			"	"	h m
Jan.	1	1 36	58.03	+0.356	+	8 45	15.9	+2.89	0.665 0022	+607.4	20.36	1.90	6 53.6
	2	1 37	6.97	0.388		8 46	27.5	3.07	0.666 4607	607.9	20.29	1.90	6 49.8
	3	1 37	16.67	0.420		8 47	43.4	3.25	0.667 9203	608.3	20.22	1.89	6 46.1
	4	1 37	27.12	0.451		8 49	3.5	3.43	0.669 3806	608.6	20.15	1.88	6 42.3
	5	1 37	38.32	0.482		8 50	27.8	3.60	0.670 8412	608.6	20.08	1.88	6 38.6
	6	1 37	50.26	+0.513	+	8 51	56.4	+3.78	0.672 3015	+608.4	20.02	1.87	6 34.8
	7	1 38	2.94	0.544		8 53	29.1	3.96	0.673 7612	608.0	19.95	1.87	6 31.1
	8	1 38	16.35	0.574		8 55	5.9	4.12	0.675 2199	607.5	19.88	1.86	6 27.4
	9	1 38	30.49	0.604		8 56	46.7	4.28	0.676 6772	606.9	19.82	1.85	6 23.7
	10	1 38	45.36	0.634		8 58	31.6	4.45	0.678 1327	606.1	19.75	1.85	6 20.0
	11	1 39	0.94	+0.664	+	9 0	20.5	+4.62	0.679 5862	+605.1	19.68	1.84	6 16.4
	12	1 39	17.24	0.694		9 2	13.3	4.78	0.681 0371	604.0	19.62	1.83	6 12.7
	13	1 39	34.24	0.723		9 4	9.9	4.94	0.682 4852	602.7	19.55	1.83	6 9.1
	14	1 39	51.94	0.752		9 6	10.5	5.10	0.683 9301	601.3	19.49	1.82	6 5.4
	15	1 40	10.34	0.781		9 8	14.8	5.26	0.685 3713	599.7	19.42	1.82	6 1.8
	16	1 40	29.43	+0.810	+	9 10	23.0	+5.42	0.686 8087	+598.0	19.36	1.81	5 58.2
	17	1 40	49.21	0.838		9 12	34.7	5.57	0.688 2418	596.2	19.29	1.80	5 54.6
	18	1 41	9.67	0.866		9 14	50.2	5.72	0.689 6703	594.2	19.23	1.80	5 51.0
	19	1 41	30.80	0.894		9 17	9.3	5.87	0.691 0939	592.1	19.17	1.79	5 47.4
	20	1 41	52.60	0.922		9 19	32.1	6.02	0.692 5122	589.8	19.11	1.79	5 43.9
	21	1 42	15.06	+0.950	+	9 21	58.3	+6.17	0.693 9249	+587.4	19.04	1.78	5 40.3
	22	1 42	38.18	0.977		9 24	28.1	6.32	0.695 3317	584.9	18.98	1.77	5 36.8
	23	1 43	1.96	1.004		9 27	1.4	6.46	0.696 7322	582.2	18.92	1.77	5 33.2
	24	1 43	26.38	1.031		9 29	38.0	6.59	0.698 1260	579.3	18.86	1.76	5 29.7
	25	1 43	51.44	1.057		9 32	17.9	6.73	0.699 5129	576.4	18.80	1.76	5 26.2
	26	1 44	17.13	+1.084	+	9 35	1.1	+6.87	0.700 8926	+573.3	18.74	1.75	5 22.7
	27	1 44	43.45	1.109		9 37	47.5	7.00	0.702 2647	570.1	18.68	1.75	5 19.2
	28	1 45	10.38	1.135		9 40	37.1	7.13	0.703 6290	566.8	18.62	1.74	5 15.7
	29	1 45	37.91	1.160		9 43	29.7	7.26	0.704 9853	563.4	18.56	1.74	5 12.2
	30	1 46	6.04	1.184		9 46	25.4	7.38	0.706 3333	559.9	18.51	1.73	5 8.8
31	1 46	34.77	+1.209	+	9 49	24.1	+7.51	0.707 6728	+556.3	18.45	1.72	5 5.3	
Feb.	1	1 47	4.07	1.233		9 52	25.7	7.62	0.709 0035	552.6	18.39	1.72	5 1.9
	2	1 47	33.95	1.257		9 55	30.1	7.74	0.710 3252	548.8	18.34	1.71	4 58.4
	3	1 48	4.41	1.281		9 58	37.3	7.86	0.711 6377	544.9	18.28	1.71	4 55.0
	4	1 48	35.42	1.304		10 1	47.3	7.97	0.712 9408	541.0	18.23	1.70	4 51.6
	5	1 49	6.99	+1.327	+10	4 59.9	+8.08	0.714 2343	+536.9	18.17	1.70	4 48.2	
	6	1 49	39.11	1.350		10 8	15.2	8.19	0.715 5181	532.9	18.12	1.69	4 44.8
	7	1 50	11.77	1.372		10 11	33.1	8.30	0.716 7921	528.8	18.07	1.69	4 41.4
	8	1 50	44.96	1.394		10 14	53.5	8.40	0.718 0561	524.5	18.01	1.68	4 38.0
	9	1 51	18.67	1.416		10 18	16.4	8.50	0.719 3098	520.2	17.96	1.68	4 34.6
	10	1 51	52.91	+1.437	+10	21 41.7	+8.60	0.720 5531	+515.9	17.91	1.67	4 31.3	
	11	1 52	27.66	1.459		10 25	9.4	8.70	0.721 7859	511.4	17.86	1.67	4 27.9
	12	1 53	2.92	1.480		10 28	39.4	8.80	0.723 0079	506.9	17.81	1.66	4 24.6
	13	1 53	38.68	1.500		10 32	11.8	8.89	0.724 2192	502.4	17.76	1.66	4 21.2
	14	1 54	14.94	1.521		10 35	46.3	8.98	0.725 4195	497.8	17.71	1.66	4 17.9
	15	1 54	51.69	+1.541	+10	39 23.0	+9.07	0.726 6087	+493.1	17.66	1.65	4 14.6	
	16	1 55	28.92	+1.561	+10	43 1.9	+9.16	0.727 7866	+488.4	17.62	1.65	4 11.3	

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit Meridian of Greenwich.		
	Noon.				Noon.										
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	Noon.	h	m
Feb. 16	1	55	28.92	+1.561	+10	43	1.9	+ 9.16	0.727 7866	+488.4	17.62	1.65	4	11.3	
17	1	56	6.62	1.581	10	46	42.8	9.25	0.728 9530	483.6	17.57	1.64	4	8.0	
18	1	56	44.79	1.600	10	50	25.8	9.33	0.730 1079	478.8	17.52	1.64	4	4.7	
19	1	57	23.44	1.620	10	54	10.8	9.41	0.731 2510	473.9	17.48	1.63	4	1.4	
20	1	58	2.55	1.639	10	57	57.7	9.49	0.732 3821	468.8	17.43	1.63	3	58.1	
21	1	58	42.10	+1.657	+11	1	46.4	+ 9.57	0.733 5011	+463.7	17.38	1.63	3	54.8	
22	1	59	22.10	1.676	11	5	36.9	9.64	0.734 6078	458.5	17.34	1.62	3	51.6	
23	2	0	2.54	1.694	11	9	29.2	9.71	0.735 7021	453.3	17.30	1.62	3	48.3	
24	2	0	43.40	1.711	11	13	23.2	9.78	0.736 7839	448.1	17.25	1.61	3	45.1	
25	2	1	24.69	1.729	11	17	18.8	9.85	0.737 8530	442.8	17.21	1.61	3	41.8	
26	2	2	6.40	+1.746	+11	21	16.0	+ 9.91	0.738 9094	+437.5	17.17	1.60	3	38.6	
27	2	2	48.52	1.763	11	25	14.7	9.98	0.739 9530	432.1	17.13	1.60	3	35.3	
28	2	3	31.04	1.780	11	29	15.0	10.04	0.710 9836	426.7	17.09	1.60	3	32.1	
Mar. 1	2	4	13.96	1.796	11	33	16.7	10.10	0.742 0013	421.3	17.05	1.59	3	28.9	
2	2	4	57.26	1.812	11	37	19.7	10.15	0.743 0059	415.8	17.01	1.59	3	25.7	
3	2	5	40.94	+1.828	+11	41	24.1	+10.21	0.743 9972	+410.3	16.97	1.59	3	22.5	
4	2	6	25.00	1.843	11	45	29.7	10.26	0.744 9754	404.8	16.93	1.58	3	19.3	
5	2	7	9.42	1.859	11	49	36.5	10.31	0.745 9403	399.3	16.89	1.58	3	16.1	
6	2	7	54.20	1.873	11	53	44.5	10.36	0.746 8920	393.8	16.86	1.58	3	12.9	
7	2	8	39.34	1.888	11	57	53.7	10.40	0.747 8305	388.2	16.82	1.57	3	9.7	
8	2	9	24.84	+1.903	+12	2	3.9	+10.45	0.748 7556	+382.7	16.79	1.57	3	6.5	
9	2	10	10.68	1.917	12	6	15.2	10.49	0.749 6673	377.1	16.75	1.57	3	3.4	
10	2	10	56.85	1.931	12	10	27.4	10.53	0.750 5655	371.4	16.72	1.56	3	0.2	
11	2	11	43.36	1.944	12	14	40.6	10.57	0.751 4501	365.8	16.68	1.56	2	57.0	
12	2	12	30.19	1.958	12	18	54.7	10.61	0.752 3211	360.1	16.65	1.56	2	53.9	
13	2	13	17.35	+1.972	+12	23	9.7	+10.64	0.753 1784	+354.4	16.62	1.55	2	50.7	
14	2	14	4.83	1.985	12	27	25.4	10.67	0.754 0220	348.7	16.58	1.55	2	47.6	
15	2	14	52.62	1.998	12	31	42.0	10.71	0.754 8519	342.9	16.55	1.55	2	44.4	
16	2	15	40.72	2.010	12	35	59.3	10.74	0.755 6680	337.2	16.52	1.54	2	41.3	
17	2	16	29.12	2.023	12	40	17.3	10.76	0.756 4703	331.4	16.49	1.54	2	38.2	
18	2	17	17.82	+2.035	+12	44	36.0	+10.79	0.757 2586	+325.6	16.46	1.54	2	35.1	
19	2	18	6.82	2.047	12	48	55.3	10.82	0.758 0330	319.8	16.43	1.54	2	32.0	
20	2	18	56.10	2.059	12	53	15.1	10.84	0.758 7934	313.9	16.40	1.53	2	28.8	
21	2	19	45.67	2.071	12	57	35.4	10.86	0.759 5396	308.0	16.37	1.53	2	25.7	
22	2	20	35.51	2.082	13	1	56.2	10.88	0.760 2717	302.1	16.35	1.53	2	22.6	
23	2	21	25.62	+2.093	+13	6	17.5	+10.89	0.760 9895	+296.1	16.32	1.53	2	19.5	
24	2	22	16.00	2.104	13	10	39.1	10.91	0.761 6929	290.1	16.29	1.52	2	16.4	
25	2	23	6.64	2.115	13	15	1.1	10.92	0.762 3821	284.1	16.27	1.52	2	13.3	
26	2	23	57.52	2.125	13	19	23.3	10.93	0.763 0568	278.1	16.24	1.52	2	10.2	
27	2	24	48.65	2.135	13	23	45.8	10.94	0.763 7171	272.1	16.22	1.52	2	7.2	
28	2	25	40.02	+2.145	+13	28	8.4	+10.95	0.764 3631	+266.1	16.19	1.51	2	4.1	
29	2	26	31.63	2.155	13	32	31.2	10.95	0.764 9946	260.1	16.17	1.51	2	1.0	
30	2	27	23.45	2.164	13	36	54.2	10.96	0.765 6117	254.1	16.15	1.51	1	57.9	
31	2	28	15.50	2.173	13	41	17.2	10.96	0.766 2144	248.1	16.12	1.51	1	54.9	
Apr. 1	2	29	7.77	2.182	13	45	40.3	10.96	0.766 8028	242.2	16.10	1.51	1	51.8	
2	2	30	0.25	+2.191	+13	50	3.4	+10.96	0.767 3768	+236.2	16.08	1.50	1	48.7	
3	2	30	52.94	+2.200	+13	54	26.5	+10.96	0.767 9363	+230.1	16.06	1.50	1	45.7	



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	Noon.				Noon.									
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	h	m
Apr.	1	2 29	7.77	+2.182	+13 45	40.3		+10.96	0.766 8028	+242.2	16.10	1.51	1 51.8	
	2	2 30	0.25	2.191	13 50	3.4		10.96	0.767 3768	236.2	16.08	1.50	1 48.7	
	3	2 30	52.94	2.200	13 54	26.5		10.96	0.767 9363	230.1	16.06	1.50	1 45.7	
	4	2 31	45.83	2.208	13 58	49.5		10.96	0.768 4814	224.1	16.04	1.50	1 42.6	
	5	2 32	38.92	2.216	14 3	12.4		10.95	0.769 0121	218.1	16.02	1.50	1 39.6	
	6	2 33	32.20	+2.224	+14 7	35.1		+10.94	0.769 5284	+212.1	16.00	1.50	1 36.5	
	7	2 34	25.66	2.231	14 11	57.7		10.94	0.770 0303	206.1	15.98	1.49	1 33.5	
	8	2 35	19.31	2.239	14 16	20.1		10.93	0.770 5179	200.2	15.96	1.49	1 30.4	
	9	2 36	13.14	2.247	14 20	42.2		10.92	0.770 9911	194.2	15.95	1.49	1 27.4	
	10	2 37	7.15	2.254	14 25	4.1		10.91	0.771 4500	188.2	15.93	1.49	1 24.4	
	11	2 38	1.32	+2.261	+14 29	25.7		+10.89	0.771 8944	+182.2	15.91	1.49	1 21.3	
	12	2 38	55.66	2.268	14 33	46.9		10.88	0.772 3244	176.2	15.90	1.49	1 18.3	
	13	2 39	50.15	2.274	14 38	7.8		10.86	0.772 7400	170.1	15.88	1.48	1 15.3	
	14	2 40	44.81	2.281	14 42	28.3		10.84	0.773 1411	164.1	15.87	1.48	1 12.3	
	15	2 41	39.62	2.287	14 46	48.3		10.82	0.773 5277	158.1	15.85	1.48	1 9.2	
	16	2 42	34.58	+2.293	+14 51	7.9		+10.81	0.773 8999	+152.1	15.84	1.48	1 6.2	
	17	2 43	29.69	2.299	14 55	27.0		10.79	0.774 2576	146.0	15.83	1.48	1 3.2	
	18	2 44	24.94	2.305	14 59	45.6		10.76	0.774 6007	139.9	15.82	1.48	1 0.2	
	19	2 45	20.32	2.311	15 4	3.7		10.74	0.774 9292	133.8	15.80	1.48	0 57.2	
	20	2 46	15.84	2.316	15 8	21.1		10.71	0.775 2431	127.8	15.79	1.48	0 54.2	
	21	2 47	11.48	+2.321	+15 12	37.9		+10.69	0.775 5424	+121.7	15.78	1.48	0 51.1	
	22	2 48	7.23	2.325	15 16	54.1		10.66	0.775 8270	115.5	15.77	1.47	0 48.1	
	23	2 49	3.10	2.330	15 21	9.5		10.63	0.776 0970	109.5	15.76	1.47	0 45.1	
	24	2 49	59.07	2.334	15 25	24.2		10.60	0.776 3524	103.4	15.75	1.47	0 42.1	
	25	2 50	55.15	2.338	15 29	38.1		10.56	0.776 5932	97.3	15.74	1.47	0 39.1	
	26	2 51	51.32	+2.342	+15 33	51.2		+10.53	0.776 8195	+ 91.2	15.73	1.47	0 36.1	
	27	2 52	47.59	2.346	15 38	3.5		10.50	0.777 0311	85.1	15.73	1.47	0 33.1	
	28	2 53	43.94	2.350	15 42	15.0		10.46	0.777 2282	79.1	15.72	1.47	0 30.1	
	29	2 54	40.38	2.353	15 46	25.6		10.42	0.777 4108	73.1	15.71	1.47	0 27.1	
	30	2 55	36.89	2.356	15 50	35.3		10.39	0.777 5789	67.0	15.71	1.47	0 24.1	
May	1	2 56	33.47	+2.359	+15 54	44.1		+10.35	0.777 7325	+ 61.0	15.70	1.47	0 21.2	
	2	2 57	30.12	2.362	15 58	52.0		10.31	0.777 8716	55.0	15.70	1.47	0 18.2	
	3	2 58	26.83	2.364	16 2	58.8		10.26	0.777 9963	49.0	15.69	1.47	0 15.2	
	4	2 59	23.60	2.367	16 7	4.7		10.22	0.778 1067	42.9	15.69	1.47	0 12.2	
	5	3 0	20.43	2.369	16 11	9.5		10.18	0.778 2027	37.0	15.68	1.47	0 9.2	
	6	3 1	17.31	+2.371	+16 15	13.3		+10.14	0.778 2845	+ 31.1	15.68	1.47	0 6.2	
	7	3 2	14.24	2.373	16 19	16.0		10.09	0.778 3519	25.1	15.68	1.47	0 3.2	
	8	3 3	11.22	2.375	16 23	17.6		10.04	0.778 4051	19.2	15.68	1.47	0 0.2	
	9	3 4	8.23	2.376	16 27	18.1		10.00	0.778 4439	13.2	15.68	1.47	23 54.2	
	10	3 5	5.27	2.378	16 31	17.5		9.95	0.778 4684	7.3	15.68	1.47	23 51.3	
	11	3 6	2.35	+2.379	+16 35	15.7		+ 9.90	0.778 4787	+ 1.3	15.67	1.47	23 48.3	
	12	3 6	59.45	2.380	16 39	12.8		9.85	0.778 4746	- 4.7	15.67	1.47	23 45.3	
	13	3 7	56.57	2.381	16 43	8.7		9.80	0.778 4562	10.6	15.68	1.47	23 42.3	
	14	3 8	53.72	2.381	16 47	3.3		9.75	0.778 4235	16.6	15.68	1.47	23 39.3	
	15	3 9	50.88	2.382	16 50	56.7		9.70	0.778 3764	22.6	15.68	1.47	23 36.3	
	16	3 10	48.05	+2.382	+16 54	48.9		+ 9.65	0.778 3150	- 28.6	15.68	1.47	23 33.3	
	17	3 11	45.23	+2.382	+16 58	39.8		+ 9.59	0.778 2392	- 34.6	15.68	1.47	23 30.3	

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paralax.	Transit, Meridian of Greenwich.	
	Noon.				Noon.									
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	h	m
May	17	3	11	45.23	+2.382	+16	58	39.8	+9.59	0.778 2392	- 34.6	15.68	1.47	23 30.3
	18	3	12	42.40	2.382	17	2	29.4	9.54	0.778 1491	40.5	15.69	1.47	23 27.4
	19	3	13	39.57	2.382	17	6	17.6	9.48	0.778 0446	46.5	15.69	1.47	23 24.4
	20	3	14	36.72	2.381	17	10	4.5	9.42	0.777 9257	52.5	15.69	1.47	23 21.4
	21	3	15	33.86	2.380	17	13	50.0	9.37	0.777 7925	58.5	15.70	1.47	23 18.4
	22	3	16	30.98	+2.379	+17	17	34.1	+9.31	0.777 6449	- 64.5	15.70	1.47	23 15.5
	23	3	17	28.07	2.378	17	21	16.8	9.25	0.777 4829	70.5	15.71	1.47	23 12.5
	24	3	18	25.12	2.376	17	24	58.1	9.19	0.777 3067	76.4	15.72	1.47	23 9.5
	25	3	19	22.13	2.375	17	28	37.9	9.13	0.777 1162	82.3	15.72	1.47	23 6.5
	26	3	20	19.10	2.373	17	32	16.3	9.07	0.776 9116	88.2	15.73	1.47	23 3.5
	27	3	21	16.01	+2.370	+17	35	53.1	+9.00	0.776 6927	- 94.1	15.74	1.47	23 0.5
June	28	3	22	12.88	2.368	17	39	28.5	8.94	0.776 4598	100.0	15.75	1.47	22 57.5
	29	3	23	9.68	2.365	17	43	2.3	8.88	0.776 2128	105.9	15.76	1.47	22 54.5
	30	3	24	6.42	2.363	17	46	34.6	8.81	0.775 9517	111.7	15.77	1.47	22 51.5
	31	3	25	3.09	2.360	17	50	5.3	8.75	0.775 6766	117.6	15.78	1.47	22 48.5
	1	3	25	59.69	+2.357	+17	53	34.5	+8.68	0.775 3875	-123.4	15.79	1.48	22 45.5
	2	3	26	56.21	2.353	17	57	2.1	8.62	0.775 0844	129.2	15.80	1.48	22 42.5
	3	3	27	52.64	2.350	18	0	28.1	8.55	0.774 7675	134.9	15.81	1.48	22 39.5
	4	3	28	48.99	2.346	18	3	52.5	8.48	0.774 4366	140.7	15.82	1.48	22 36.5
	5	3	29	45.24	2.342	18	7	15.3	8.42	0.774 0920	146.5	15.83	1.48	22 33.5
	6	3	30	41.40	+2.338	+18	10	36.5	+8.35	0.773 7334	-152.3	15.85	1.48	22 30.6
	7	3	31	37.46	2.334	18	13	56.1	8.28	0.773 3610	158.1	15.86	1.48	22 27.6
	8	3	32	33.42	2.329	18	17	14.0	8.21	0.772 9748	163.8	15.87	1.48	22 24.6
	9	3	33	29.27	2.325	18	20	30.2	8.14	0.772 5748	169.5	15.89	1.49	22 21.5
	10	3	34	25.01	2.320	18	23	44.8	8.07	0.772 1610	175.3	15.90	1.49	22 18.5
	11	3	35	20.63	+2.315	+18	26	57.7	+8.00	0.771 7335	-181.0	15.92	1.49	22 15.5
	12	3	36	16.13	2.310	18	30	9.0	7.93	0.771 2921	186.8	15.94	1.49	22 12.5
	13	3	37	11.49	2.304	18	33	18.5	7.86	0.770 8369	192.6	15.95	1.49	22 9.5
	14	3	38	6.72	2.298	18	36	26.3	7.79	0.770 3678	198.4	15.97	1.49	22 6.5
	15	3	39	1.81	2.293	18	39	32.4	7.72	0.769 8848	204.1	15.99	1.49	22 3.5
	16	3	39	56.76	+2.286	+18	42	36.7	+7.64	0.769 3880	-209.9	16.01	1.50	22 0.4
	17	3	40	51.54	2.279	18	45	39.3	7.57	0.768 8775	215.6	16.03	1.50	21 57.4
	18	3	41	46.17	2.273	18	48	40.0	7.50	0.768 3531	221.3	16.04	1.50	21 54.4
	19	3	42	40.63	2.266	18	51	39.1	7.42	0.767 8151	227.0	16.06	1.50	21 51.3
	20	3	43	34.92	2.258	18	54	36.3	7.35	0.767 2634	232.7	16.08	1.50	21 48.3
	21	3	44	29.02	+2.250	+18	57	31.8	+7.27	0.766 6981	-238.4	16.10	1.51	21 45.3
	22	3	45	22.94	2.243	19	0	25.4	7.20	0.766 1193	244.0	16.13	1.51	21 42.2
	23	3	46	16.67	2.235	19	3	17.2	7.12	0.765 5270	249.6	16.15	1.51	21 39.2
	24	3	47	10.21	2.227	19	6	7.2	7.05	0.764 9211	255.2	16.17	1.51	21 36.1
	25	3	48	3.54	2.218	19	8	55.4	6.97	0.764 3019	260.7	16.19	1.51	21 33.0
	26	3	48	56.66	+2.209	+19	11	41.8	+6.89	0.763 6692	-266.4	16.22	1.52	21 30.0
	27	3	49	49.56	2.200	19	14	26.3	6.82	0.763 0232	271.9	16.24	1.52	21 27.0
28	3	50	42.25	2.190	19	17	9.1	6.74	0.762 3640	277.4	16.27	1.52	21 23.9	
29	3	51	34.70	2.181	19	19	49.9	6.66	0.761 6917	282.9	16.29	1.52	21 20.8	
30	3	52	26.93	2.171	19	22	29.0	6.59	0.761 0062	288.3	16.32	1.53	21 17.8	
uly	1	3	53	18.92	+2.161	+19	25	6.2	+6.51	0.760 3077	-293.8	16.34	1.53	21 14.7
	2	3	54	10.67	+2.151	+19	27	41.5	+6.43	0.759 5962	-299.2	16.37	1.53	21 11.6

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	Noon.				Noon.									
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	h	m
July	1	3	53	18.92	+2.161	+19	25	6.2	+6.51	0.760 3077	-293.8	16.34	1.53	21 14.7
	2	3	54	10.67	2.151	19	27	41.5	6.43	0.759 5962	299.2	16.37	1.53	21 11.6
	3	3	55	2.17	2.140	19	30	14.9	6.35	0.758 8717	304.5	16.40	1.53	21 8.6
	4	3	55	53.41	2.130	19	32	46.5	6.28	0.758 1344	309.9	16.43	1.54	21 5.5
	5	3	56	44.40	2.119	19	35	16.2	6.20	0.757 3842	315.3	16.45	1.54	21 2.4
	6	3	57	35.12	+2.108	+19	37	44.1	+6.12	0.756 6210	-320.6	16.48	1.54	20 59.3
	7	3	58	25.58	2.096	19	40	10.2	6.05	0.755 8451	326.0	16.51	1.54	20 56.2
	8	3	59	15.75	2.085	19	42	34.3	5.97	0.755 0564	331.3	16.54	1.55	20 53.1
	9	4	0	5.65	2.073	19	44	56.6	5.89	0.754 2549	336.6	16.57	1.55	20 50.0
	10	4	0	55.27	2.061	19	47	17.0	5.81	0.753 4407	341.9	16.60	1.55	20 46.9
	11	4	1	44.59	+2.049	+19	49	35.6	+5.74	0.752 6138	-347.2	16.64	1.56	20 43.7
	12	4	2	33.60	2.036	19	51	52.3	5.66	0.751 7742	352.5	16.67	1.56	20 40.6
	13	4	3	22.31	2.023	19	54	7.1	5.58	0.750 9220	357.7	16.70	1.56	20 37.5
	14	4	4	10.69	2.009	19	56	19.9	5.50	0.750 0571	363.0	16.73	1.56	20 34.4
	15	4	4	58.75	1.995	19	58	30.9	5.42	0.749 1796	368.3	16.77	1.57	20 31.2
	16	4	5	46.47	+1.981	+20	0	40.0	+5.34	0.748 2895	-373.4	16.80	1.57	20 28.1
	17	4	6	33.86	1.967	20	2	47.2	5.26	0.747 3872	378.5	16.84	1.57	20 24.9
	18	4	7	20.90	1.952	20	4	52.6	5.18	0.746 4727	383.6	16.87	1.58	20 21.8
	19	4	8	7.58	1.938	20	6	56.0	5.10	0.745 5459	388.7	16.91	1.58	20 18.6
	20	4	8	53.90	1.922	20	8	57.6	5.03	0.744 6071	393.7	16.95	1.58	20 15.4
	21	4	9	39.84	+1.906	+20	10	57.3	+4.95	0.743 6562	-398.7	16.98	1.59	20 12.3
	22	4	10	25.41	1.891	20	12	55.0	4.87	0.742 6935	403.6	17.02	1.59	20 9.1
	23	4	11	10.59	1.874	20	14	50.9	4.79	0.741 7189	408.5	17.06	1.59	20 5.9
	24	4	11	55.38	1.858	20	16	44.9	4.71	0.740 7326	413.4	17.10	1.60	20 2.7
	25	4	12	39.77	1.841	20	18	37.0	4.63	0.739 7348	418.1	17.14	1.60	19 59.5
	26	4	13	23.75	+1.824	+20	20	27.3	+4.55	0.738 7255	-422.9	17.18	1.61	19 56.3
	27	4	14	7.32	1.807	20	22	15.6	4.48	0.737 7049	427.6	17.22	1.61	19 53.1
	28	4	14	50.47	1.789	20	24	2.1	4.40	0.736 6731	432.2	17.26	1.61	19 49.9
	29	4	15	33.20	1.771	20	25	46.8	4.32	0.735 6302	436.8	17.30	1.62	19 46.6
	30	4	16	15.49	1.753	20	27	29.6	4.25	0.734 5764	441.4	17.34	1.62	19 43.4
	31	4	16	57.34	+1.734	+20	29	10.6	+4.17	0.733 5116	-445.9	17.39	1.63	19 40.1
Aug.	1	4	17	38.74	1.716	20	30	49.7	4.09	0.732 4361	450.4	17.43	1.63	19 36.9
	2	4	18	19.69	1.697	20	32	27.0	4.01	0.731 3499	454.8	17.47	1.63	19 33.6
	3	4	19	0.18	1.677	20	34	2.4	3.94	0.730 2531	459.2	17.52	1.64	19 30.4
	4	4	19	40.20	1.658	20	35	36.0	3.86	0.729 1458	463.5	17.56	1.64	19 27.1
	5	4	20	19.74	+1.638	+20	37	7.7	+3.78	0.728 0281	-467.8	17.61	1.65	19 23.8
	6	4	20	58.80	1.617	20	38	37.6	3.71	0.726 9001	472.1	17.65	1.65	19 20.5
	7	4	21	37.37	1.597	20	40	5.7	3.63	0.725 7619	476.4	17.70	1.65	19 17.2
	8	4	22	15.44	1.576	20	41	32.0	3.56	0.724 6136	480.5	17.74	1.66	19 13.9
	9	4	22	53.00	1.554	20	42	56.4	3.48	0.723 4554	484.6	17.79	1.66	19 10.6
	10	4	23	30.05	+1.533	+20	44	19.1	+3.41	0.722 2874	-488.7	17.84	1.67	19 7.3
	11	4	24	6.58	1.511	20	45	39.9	3.33	0.721 1096	492.7	17.89	1.67	19 3.9
	12	4	24	42.57	1.488	20	46	58.9	3.25	0.719 9223	496.7	17.94	1.68	19 0.6
	13	4	25	18.02	1.465	20	48	16.1	3.18	0.718 7257	500.5	17.99	1.68	18 57.2
	14	4	25	52.91	1.442	20	49	31.5	3.11	0.717 5199	504.3	18.04	1.69	18 53.9
	15	4	26	27.24	+1.419	+20	50	45.2	+3.03	0.716 3051	-508.0	18.09	1.69	18 50.5
	16	4	27	1.01	+1.395	+20	51	57.1	+2.96	0.715 0815	-511.6	18.14	1.70	18 47.1

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paralax.	Transit. Meridian of Greenwich.	
	Noon.				Noon.									
	h	m	s	s	°	'	"	"			"	"	h	m
Aug. 16	4	27	1.01	+1.398	+20	51	57.1	+2.96	0.715 0815	-511.6	18.14	1.70	18	47.1
17	4	27	34.19	1.370	20	53	7.1	2.88	0.713 8494	515.1	18.19	1.70	18	43.7
18	4	28	6.79	1.346	20	54	15.4	2.81	0.712 6089	518.6	18.24	1.71	18	40.3
19	4	28	38.79	1.321	20	55	22.0	2.74	0.711 3603	521.9	18.29	1.71	18	36.9
20	4	29	10.19	1.295	20	56	26.7	2.66	0.710 1037	525.2	18.35	1.72	18	33.5
21	4	29	40.97	+1.270	+20	57	29.7	+2.59	0.708 8394	-528.4	18.40	1.72	18	30.1
22	4	30	11.14	1.244	20	58	31.0	2.52	0.707 5676	531.4	18.45	1.73	18	26.6
23	4	30	40.68	1.218	20	59	30.5	2.44	0.706 2886	534.4	18.51	1.73	18	23.2
24	4	31	9.58	1.191	21	0	28.3	2.37	0.705 0026	537.2	18.56	1.74	18	19.7
25	4	31	37.84	1.164	21	1	24.4	2.30	0.703 7098	540.0	18.62	1.74	18	16.2
26	4	32	5.46	+1.137	+21	2	18.8	+2.23	0.702 4106	-542.6	18.68	1.75	18	12.8
27	4	32	32.42	1.110	21	3	11.4	2.16	0.701 1051	545.2	18.73	1.75	18	9.3
28	4	32	58.72	1.082	21	4	2.4	2.09	0.699 7937	547.6	18.79	1.76	18	5.8
29	4	33	24.34	1.054	21	4	51.6	2.02	0.698 4765	550.0	18.85	1.76	18	2.3
30	4	33	49.29	1.025	21	5	39.2	1.95	0.697 1538	552.2	18.90	1.77	17	58.7
31	4	34	13.56	+0.997	+21	6	25.0	+1.88	0.695 8258	-554.4	18.96	1.77	17	55.2
Sept. 1	4	34	37.14	0.968	21	7	9.2	1.81	0.694 4928	556.4	19.02	1.78	17	51.6
2	4	35	0.01	0.939	21	7	51.7	1.74	0.693 1551	558.3	19.08	1.78	17	48.1
3	4	35	22.19	0.909	21	8	32.6	1.67	0.691 8129	560.2	19.14	1.79	17	44.5
4	4	35	43.65	0.879	21	9	11.8	1.60	0.690 4664	561.9	19.20	1.79	17	40.9
5	4	36	4.39	+0.840	+21	9	49.3	+1.53	0.689 1159	-563.5	19.26	1.80	17	37.3
6	4	36	24.40	0.818	21	10	25.1	1.46	0.687 7618	564.9	19.32	1.81	17	33.7
7	4	36	43.67	0.788	21	10	59.3	1.39	0.686 4043	566.3	19.38	1.81	17	30.1
8	4	37	2.20	0.756	21	11	31.9	1.32	0.685 0437	567.5	19.44	1.82	17	26.5
9	4	37	19.97	0.725	21	12	2.8	1.25	0.683 6803	568.6	19.50	1.82	17	22.8
10	4	37	36.98	+0.693	+21	12	32.1	+1.19	0.682 3146	-569.5	19.56	1.83	17	19.2
11	4	37	53.22	0.660	21	12	59.8	1.12	0.680 9470	570.2	19.62	1.83	17	15.5
12	4	38	8.68	0.628	21	13	25.8	1.05	0.679 5777	570.8	19.68	1.84	17	11.8
13	4	38	23.36	0.595	21	13	50.2	0.98	0.678 2072	571.2	19.75	1.85	17	8.1
14	4	38	37.24	0.562	21	14	13.0	0.92	0.676 8359	571.5	19.81	1.85	17	4.4
15	4	38	50.33	+0.529	+21	14	34.2	+0.85	0.675 4642	-571.6	19.87	1.86	17	0.7
16	4	39	2.61	0.495	21	14	53.7	0.78	0.674 0925	571.5	19.93	1.86	16	57.0
17	4	39	14.08	0.461	21	15	11.7	0.71	0.672 7212	571.2	20.00	1.87	16	53.2
18	4	39	24.74	0.427	21	15	28.0	0.65	0.671 3509	570.7	20.06	1.88	16	49.4
19	4	39	34.58	0.393	21	15	42.8	0.58	0.669 9820	570.0	20.12	1.88	16	45.7
20	4	39	43.59	+0.358	+21	15	55.9	+0.51	0.668 6148	-569.2	20.19	1.89	16	41.9
21	4	39	51.78	0.324	21	16	7.5	0.45	0.667 2499	568.2	20.25	1.89	16	38.1
22	4	39	59.14	0.289	21	16	17.4	0.38	0.665 8877	567.0	20.31	1.90	16	34.2
23	4	40	5.67	0.254	21	16	25.8	0.32	0.664 5287	565.5	20.38	1.90	16	30.4
24	4	40	11.35	0.219	21	16	32.6	0.25	0.663 1733	563.9	20.44	1.91	16	26.6
25	4	40	16.20	+0.184	+21	16	37.9	+0.19	0.661 8220	-562.1	20.50	1.92	16	22.7
26	4	40	20.20	0.149	21	16	41.5	0.12	0.660 4753	560.1	20.57	1.92	16	18.8
27	4	40	23.36	0.114	21	16	43.6	+0.05	0.659 1337	557.9	20.63	1.93	16	14.9
28	4	40	25.67	0.078	21	16	44.1	-0.01	0.657 7976	555.5	20.70	1.94	16	11.0
29	4	40	27.13	0.043	21	16	43.1	0.08	0.656 4675	552.9	20.76	1.94	16	7.1
30	4	40	27.74	+0.008	+21	16	40.4	-0.14	0.655 1439	-550.1	20.82	1.95	16	3.2
Oct. 1	4	40	27.50	-0.028	+21	16	36.2	-0.21	0.653 8271	-547.2	20.89	1.95	15	59.2

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Paralax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	h m
	h	m	s	s	°	'	"	"	Noon.	Noon.	"	"	
Oct.	1	4 40	27.50	-0.028	+21 16	36.2	-0.21	0.653 8271	-547.2	20.89	1.95	15 59.2	
	2	4 40	26.41	0.063	21 16	30.5	0.27	0.652 5178	543.9	20.95	1.96	15 55.3	
	3	4 40	24.46	0.099	21 16	23.2	0.34	0.651 2163	540.6	21.01	1.96	15 51.3	
	4	4 40	21.66	0.135	21 16	14.3	0.40	0.649 9232	537.0	21.07	1.97	15 47.3	
	5	4 40	18.00	0.170	21 16	3.9	0.47	0.648 6390	533.1	21.14	1.98	15 43.3	
	6	4 40	13.48	-0.206	+21 15	51.8	-0.53	0.647 3644	-529.0	21.20	1.98	15 39.3	
	7	4 40	8.11	0.242	21 15	38.2	0.60	0.646 0998	524.7	21.26	1.99	15 35.3	
	8	4 40	1.87	0.278	21 15	23.1	0.66	0.644 8459	520.2	21.32	1.99	15 31.2	
	9	4 39	54.77	0.314	21 15	6.4	0.73	0.643 6032	515.4	21.38	2.00	15 27.2	
	10	4 39	46.82	0.349	21 14	48.1	0.79	0.642 3724	510.3	21.44	2.00	15 23.1	
	11	4 39	38.01	-0.385	+21 14	28.3	-0.86	0.641 1540	-505.1	21.50	2.01	15 19.0	
	12	4 39	28.35	0.420	21 14	6.9	0.92	0.639 9487	499.4	21.56	2.02	15 14.9	
	13	4 39	17.85	0.455	21 13	44.0	0.99	0.638 7570	493.6	21.62	2.02	15 10.8	
	14	4 39	6.50	0.490	21 13	19.5	1.05	0.637 5796	487.5	21.68	2.03	15 6.6	
	15	4 38	54.32	0.525	21 12	53.5	1.12	0.636 4172	481.1	21.74	2.03	15 2.5	
	16	4 38	41.31	-0.559	+21 12	25.9	-1.18	0.635 2703	-474.5	21.80	2.04	14 58.4	
	17	4 38	27.47	0.594	21 11	56.8	1.24	0.634 1396	467.7	21.85	2.04	14 54.2	
	18	4 38	12.82	0.628	21 11	26.3	1.31	0.633 0256	460.6	21.91	2.05	14 50.0	
	19	4 37	57.35	0.661	21 10	54.1	1.37	0.631 9291	453.2	21.96	2.05	14 45.8	
	20	4 37	41.09	0.694	21 10	20.5	1.43	0.630 8506	445.5	22.02	2.06	14 41.6	
	21	4 37	24.04	-0.726	+21 9	45.3	-1.50	0.629 7907	-437.7	22.07	2.06	14 37.4	
	22	4 37	6.22	0.759	21 9	8.7	1.56	0.628 7501	429.5	22.13	2.07	14 33.2	
	23	4 36	47.62	0.791	21 8	30.5	1.62	0.627 7292	421.2	22.18	2.07	14 28.9	
	24	4 36	28.27	0.822	21 7	50.9	1.68	0.626 7287	412.6	22.23	2.08	14 24.6	
	25	4 36	8.18	0.852	21 7	9.9	1.74	0.625 7491	403.7	22.28	2.08	14 20.4	
	26	4 35	47.36	-0.882	+21 6	27.4	-1.80	0.624 7910	-394.7	22.33	2.09	14 16.1	
	27	4 35	25.82	0.912	21 5	43.5	1.86	0.623 8548	385.4	22.38	2.09	14 11.8	
	28	4 35	3.58	0.941	21 4	58.1	1.92	0.622 9413	375.9	22.43	2.10	14 7.5	
	29	4 34	40.65	0.970	21 4	11.2	1.98	0.622 0508	366.2	22.47	2.10	14 3.2	
	30	4 34	17.04	0.998	21 3	23.0	2.04	0.621 1839	356.2	22.52	2.11	13 58.9	
31	4 33	52.76	-1.025	+21 2	33.4	-2.10	0.620 3411	-346.1	22.56	2.11	13 54.5		
Nov.	1	4 33	27.84	1.052	21 1	42.4	2.15	0.619 5230	335.8	22.60	2.11	13 50.2	
	2	4 33	2.28	1.078	21 0	50.1	2.21	0.618 7301	325.0	22.64	2.12	13 45.8	
	3	4 32	36.10	1.104	20 59	56.5	2.26	0.617 9630	314.2	22.68	2.12	13 41.4	
	4	4 32	9.32	1.128	20 59	1.6	2.31	0.617 2221	303.2	22.72	2.12	13 37.0	
	5	4 31	41.96	-1.152	+20 58	5.4	-2.37	0.616 5080	-291.9	22.76	2.13	13 32.6	
	6	4 31	14.03	1.175	20 57	7.9	2.42	0.615 8212	280.4	22.80	2.13	13 28.2	
	7	4 30	45.55	1.198	20 56	9.1	2.47	0.615 1622	268.7	22.83	2.13	13 23.8	
	8	4 30	16.54	1.219	20 55	9.1	2.52	0.614 5315	256.3	22.86	2.14	13 19.4	
	9	4 29	47.03	1.240	20 54	7.9	2.57	0.613 9296	244.7	22.90	2.14	13 15.0	
	10	4 29	17.03	-1.260	+20 53	5.5	-2.62	0.613 3570	-232.4	22.93	2.14	13 10.5	
	11	4 28	46.56	1.279	20 52	1.9	2.67	0.612 8141	219.9	22.95	2.15	13 6.1	
	12	4 28	15.65	1.297	20 50	57.3	2.71	0.612 3014	207.3	22.98	2.15	13 1.6	
	13	4 27	44.33	1.313	20 49	51.7	2.75	0.611 8192	194.5	23.01	2.15	12 57.2	
	14	4 27	12.61	1.329	20 48	45.1	2.79	0.611 3680	181.5	23.03	2.15	12 52.8	
	15	4 26	40.52	-1.344	+20 47	37.6	-2.83	0.610 9481	-168.4	23.05	2.16	12 48.3	
	16	4 26	8.08	-1.358	+20 46	29.1	-2.88	0.610 5600	-155.1	23.07	2.16	12 43.8	

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			"	"	h m
Nov. 16	4 26 8.08	-1.338	+20 46 29.1	-2.87	0.610 5600	-155.1	23.07	2.16	12 43.8
17	4 25 35.32	1.371	20 45 19.8	2.91	0.610 2038	141.7	23.09	2.16	12 39.3
18	4 25 2.27	1.382	20 44 9.6	2.94	0.609 8800	128.1	23.11	2.16	12 34.9
19	4 24 28.96	1.393	20 42 58.7	2.97	0.609 5887	114.6	23.13	2.16	12 30.4
20	4 23 55.40	1.403	20 41 47.0	3.00	0.609 3301	100.9	23.14	2.16	12 25.9
21	4 23 21.64	-1.411	+20 40 34.6	-3.03	0.609 1044	-87.1	23.15	2.16	12 21.4
22	4 22 47.69	1.418	20 39 21.6	3.05	0.608 9118	73.4	23.16	2.17	12 16.9
23	4 22 13.57	1.424	20 38 8.1	3.08	0.608 7523	59.5	23.17	2.17	12 12.4
24	4 21 39.33	1.429	20 36 54.0	3.10	0.608 6262	45.6	23.18	2.17	12 7.9
25	4 21 4.97	1.433	20 35 39.5	3.11	0.608 5334	31.7	23.18	2.17	12 3.4
26	4 20 30.54	-1.436	+20 34 24.5	-3.13	0.608 4741	-17.7	23.18	2.17	11 58.9
27	4 19 56.05	1.438	20 33 9.2	3.14	0.608 4483	-3.8	23.19	2.17	11 54.4
28	4 19 21.53	1.439	20 31 53.7	3.15	0.608 4561	+10.2	23.19	2.17	11 49.9
29	4 18 47.00	1.438	20 30 37.9	3.16	0.608 4975	24.2	23.18	2.17	11 45.4
30	4 18 12.49	1.437	20 29 22.0	3.17	0.608 5725	38.2	23.18	2.17	11 40.9
Dec. 1	4 17 38.03	-1.434	+20 28 5.9	-3.17	0.608 6810	+52.2	23.18	2.17	11 36.4
2	4 17 3.65	1.431	20 26 49.9	3.17	0.608 8231	66.2	23.18	2.17	11 31.9
3	4 16 29.36	1.426	20 25 33.9	3.17	0.608 9987	80.1	23.16	2.17	11 27.4
4	4 15 55.20	1.421	20 24 17.9	3.16	0.609 2077	94.0	23.15	2.16	11 22.9
5	4 15 21.18	1.414	20 23 2.2	3.15	0.609 4501	107.9	23.13	2.16	11 18.4
6	4 14 47.34	-1.406	+20 21 46.6	-3.14	0.609 7257	+121.7	23.12	2.16	11 13.9
7	4 14 13.71	1.397	20 20 31.4	3.13	0.610 0344	135.5	23.10	2.16	11 9.4
8	4 13 40.30	1.387	20 19 16.5	3.11	0.610 3761	149.2	23.08	2.16	11 4.9
9	4 13 7.14	1.376	20 18 2.2	3.09	0.610 7505	162.8	23.06	2.16	11 0.4
10	4 12 34.27	1.363	20 16 48.3	3.06	0.611 1576	176.3	23.04	2.15	10 56.0
11	4 12 1.70	-1.350	+20 15 35.1	-3.04	0.611 5969	+189.8	23.02	2.15	10 51.5
12	4 11 29.46	1.336	20 14 22.5	3.01	0.612 0684	203.1	22.99	2.15	10 47.0
13	4 10 57.58	1.320	20 13 10.6	2.98	0.612 5717	216.3	22.97	2.15	10 42.6
14	4 10 26.08	1.304	20 11 59.6	2.94	0.613 1064	229.3	22.94	2.14	10 38.1
15	4 9 54.99	1.286	20 10 49.5	2.90	0.613 6722	242.2	22.91	2.14	10 33.7
16	4 9 24.33	-1.268	+20 9 40.4	-2.86	0.614 2687	+254.9	22.88	2.14	10 29.2
17	4 8 54.12	1.249	20 8 32.3	2.82	0.614 8955	267.4	22.85	2.14	10 24.8
18	4 8 24.39	1.228	20 7 25.2	2.77	0.615 5522	279.8	22.81	2.13	10 20.4
19	4 7 55.16	1.207	20 6 19.4	2.72	0.616 2383	291.9	22.77	2.13	10 16.0
20	4 7 26.45	1.185	20 5 14.8	2.66	0.616 9533	303.8	22.74	2.13	10 11.6
21	4 6 58.28	-1.162	+20 4 11.5	-2.61	0.617 6968	+315.6	22.70	2.12	10 7.2
22	4 6 30.67	1.138	20 3 9.6	2.55	0.618 4681	327.1	22.66	2.12	10 2.8
23	4 6 3.64	1.114	20 2 9.1	2.49	0.619 2668	338.4	22.62	2.11	9 58.4
24	4 5 37.20	1.089	20 1 10.1	2.43	0.620 0924	349.5	22.57	2.11	9 54.1
25	4 5 11.37	1.063	20 0 12.6	2.36	0.620 9443	360.3	22.53	2.11	9 49.7
26	4 4 46.16	-1.037	+19 59 16.7	-2.29	0.621 8220	+371.0	22.48	2.10	9 45.4
27	4 4 21.59	1.010	19 58 22.5	2.22	0.622 7250	381.4	22.44	2.10	9 41.0
28	4 3 57.68	0.982	19 57 30.0	2.15	0.623 6526	391.6	22.39	2.09	9 36.7
29	4 3 34.44	0.954	19 56 39.3	2.08	0.624 6045	401.6	22.34	2.09	9 32.4
30	4 3 11.89	0.925	19 55 50.4	2.00	0.625 5800	411.3	22.29	2.08	9 28.1
31	4 2 50.04	-0.896	+19 55 3.4	-1.92	0.626 5786	+420.8	22.24	2.08	9 23.8
32	4 2 28.89	...	+19 54 18.3	...	0.627 6000	...	22.19	2.07	9 19.5

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	' "	"	° ' "	"		
Jan.	1	36 39 41.0	5 27.38	-21.8	-1 9 54.8	+3.40	0.696 5008	+126.6
	5	37 1 30.4	5 27.30	22.0	1 9 41.1	3.44	0.696 5518	128.4
	9	37 23 19.4	5 27.22	22.2	1 9 27.3	3.48	0.696 6035	130.2
	13	37 45 8.1	5 27.14	22.3	1 9 13.3	3.52	0.696 6560	132.1
	17	38 6 56.5	5 27.06	22.5	1 8 59.1	3.57	0.696 7092	133.9
	21	38 28 44.6	5 26.98	-22.7	-1 8 44.7	+3.61	0.696 7631	+135.8
	25	38 50 32.3	5 26.89	22.9	1 8 30.2	3.65	0.696 8178	137.5
	29	39 12 19.7	5 26.81	23.1	1 8 15.5	3.69	0.696 8731	139.3
Feb.	2	39 34 6.8	5 26.72	23.2	1 8 0.7	3.73	0.696 9292	141.1
	6	39 55 53.5	5 26.64	23.4	1 7 45.7	3.77	0.696 9860	142.9
	10	40 17 39.9	5 26.55	-23.6	-1 7 30.5	+3.81	0.697 0435	+144.5
	14	40 39 25.9	5 26.46	23.7	1 7 15.2	3.84	0.697 1016	146.2
	18	41 1 11.6	5 26.38	23.9	1 6 59.8	3.88	0.697 1605	148.1
	22	41 22 56.9	5 26.29	24.0	1 6 44.2	3.93	0.697 2201	149.8
	26	41 44 41.9	5 26.20	24.2	1 6 28.4	3.97	0.697 2804	151.6
	2	42 6 26.5	5 26.10	-24.4	-1 6 12.4	+4.01	0.697 3414	+153.3
Mar.	6	42 28 10.7	5 26.00	24.5	1 5 56.3	4.04	0.697 4030	155.0
	10	42 49 54.5	5 25.91	24.6	1 5 40.1	4.08	0.697 4654	156.7
	14	43 11 38.0	5 25.81	24.8	1 5 23.7	4.12	0.697 5284	158.4
	18	43 33 21.0	5 25.71	24.9	1 5 7.1	4.16	0.697 5921	160.1
	22	43 55 3.7	5 25.62	-25.0	-1 4 50.4	+4.19	0.697 6565	+161.9
	26	44 16 46.0	5 25.52	25.1	1 4 33.6	4.22	0.697 7216	163.5
	30	44 38 27.9	5 25.42	25.3	1 4 16.6	4.26	0.697 7873	165.1
	3	45 0 9.4	5 25.32	25.4	1 3 59.5	4.30	0.697 8537	166.9
Apr.	7	45 21 50.5	5 25.22	25.5	1 3 42.2	4.35	0.697 9208	168.5
	11	45 43 31.2	5 25.11	-25.6	-1 3 24.7	+4.39	0.697 9885	+170.0
	15	46 5 11.4	5 25.01	25.7	1 3 7.1	4.41	0.698 0568	171.7
	19	46 26 51.3	5 24.91	25.8	1 2 49.4	4.45	0.698 1259	173.4
	23	46 48 30.7	5 24.81	25.9	1 2 31.5	4.49	0.698 1955	175.0
	27	47 10 9.8	5 24.70	26.0	1 2 13.5	4.52	0.698 2659	176.7
	1	47 31 48.3	5 24.59	-26.0	-1 1 55.3	+4.56	0.698 3369	+178.3
	5	47 53 26.5	5 24.49	26.1	1 1 37.0	4.59	0.698 4085	179.8
May	9	48 15 4.2	5 24.38	26.2	1 1 18.6	4.62	0.698 4807	181.4
	13	48 36 41.5	5 24.28	26.3	1 1 0.0	4.66	0.698 5536	183.0
	17	48 58 18.4	5 24.16	26.4	1 0 41.3	4.70	0.698 6271	184.6
	21	49 19 54.8	5 24.04	-26.4	-1 0 22.4	+4.74	0.698 7013	+186.2
	25	49 41 30.7	5 23.93	26.5	1 0 3.4	4.76	0.698 7761	187.8
	29	50 3 6.2	5 23.82	26.5	0 59 44.3	4.80	0.698 8515	189.3
	2	50 24 41.3	5 23.71	26.6	0 59 25.0	4.84	0.698 9275	190.8
	6	50 46 15.9	5 23.59	26.6	0 59 5.6	4.86	0.699 0041	192.3
June	10	51 7 50.0	5 23.46	-26.7	-0 58 46.1	+4.89	0.699 0813	+193.9
	14	51 29 23.6	5 23.35	26.7	0 58 26.5	4.92	0.699 1592	195.4
	18	51 50 56.8	5 23.24	26.8	0 58 6.7	4.96	0.699 2376	196.8
	22	52 12 29.5	5 23.12	26.8	0 57 46.8	5.00	0.699 3166	198.4
	26	52 34 1.8	5 23.00	26.8	0 57 26.7	5.04	0.699 3963	199.9
	30	52 55 33.5	5 22.88	-26.8	-0 57 6.5	+5.06	0.699 4765	+201.3
	4	53 17 4.8	5 22.76	-26.8	-0 56 46.2	+5.09	0.699 5573	+202.7
July								



## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	' "	"	° ' "	"		
July	4	53 17 4.8	5 22.76	-26.8	-0 56 46.2	+5.09	0.699 5573	+202.7
	8	53 38 35.6	5 22.64	26.8	0 56 25.8	5.12	0.699 6387	204.2
	12	54 0 5.9	5 22.51	26.8	0 56 5.2	5.16	0.699 7207	205.6
	16	54 21 35.7	5 22.39	26.9	0 55 44.5	5.19	0.699 8032	207.0
	20	54 43 5.0	5 22.26	26.9	0 55 23.7	5.21	0.699 8863	208.5
	24	55 4 33.8	5 22.14	-26.9	-0 55 2.8	+5.24	0.699 9700	+210.0
	28	55 26 2.1	5 22.01	26.8	0 54 41.8	5.27	0.700 0543	211.5
	1	55 47 29.9	5 21.89	26.8	0 54 20.6	5.30	0.700 1392	212.9
Aug.	5	56 8 57.2	5 21.76	26.8	0 53 59.4	5.33	0.700 2246	214.1
	9	56 30 24.0	5 21.64	26.8	0 53 38.0	5.37	0.700 3105	215.5
	13	56 51 50.3	5 21.50	-26.8	-0 53 16.4	+5.40	0.700 3970	+217.0
	17	57 13 16.0	5 21.36	26.8	0 52 54.8	5.42	0.700 4841	218.4
	21	57 34 41.2	5 21.24	26.7	0 52 33.1	5.45	0.700 5717	219.7
	25	57 56 6.0	5 21.11	26.7	0 52 11.2	5.48	0.700 6599	221.0
	29	58 17 30.1	5 20.98	26.6	0 51 49.2	5.50	0.700 7485	222.4
	2	58 38 53.8	5 20.85	-26.6	-0 51 27.2	+5.53	0.700 8378	+223.7
Sept.	6	59 0 16.9	5 20.71	26.6	0 51 5.0	5.56	0.700 9275	225.0
	10	59 21 39.5	5 20.58	26.5	0 50 42.7	5.59	0.701 0178	226.4
	14	59 43 1.5	5 20.45	26.4	0 50 20.3	5.62	0.701 1086	227.6
	18	60 4 23.1	5 20.31	26.4	0 49 57.7	5.65	0.701 1999	228.9
	22	60 25 44.0	5 20.17	-26.3	-0 49 35.1	+5.67	0.701 2917	+230.1
	26	60 47 4.4	5 20.04	26.2	0 49 12.4	5.70	0.701 3840	231.5
	30	61 8 24.3	5 19.90	26.2	0 48 49.5	5.72	0.701 4769	232.7
	4	61 29 43.6	5 19.76	26.1	0 48 26.6	5.75	0.701 5702	233.9
Oct.	8	61 51 2.4	5 19.62	26.0	0 48 3.5	5.77	0.701 6640	235.0
	12	62 12 20.6	5 19.48	-25.9	-0 47 40.4	+5.79	0.701 7582	+236.2
	16	62 33 38.2	5 19.34	25.8	0 47 17.2	5.81	0.701 8530	237.6
	20	62 54 55.3	5 19.20	25.8	0 46 53.9	5.85	0.701 9483	238.8
	24	63 16 11.8	5 19.06	25.7	0 46 30.4	5.87	0.702 0440	239.9
	28	63 37 27.8	5 18.92	25.6	0 46 6.9	5.89	0.702 1402	241.0
	1	63 58 43.2	5 18.78	-25.4	-0 45 43.3	+5.92	0.702 2368	+242.2
	5	64 19 58.0	5 18.63	25.3	0 45 19.5	5.94	0.702 3340	243.4
Nov.	9	64 41 12.2	5 18.49	25.2	0 44 55.7	5.96	0.702 4315	244.5
	13	65 2 25.9	5 18.35	25.1	0 44 31.8	5.99	0.702 5296	245.7
	17	65 23 39.0	5 18.20	25.0	0 44 7.8	6.01	0.702 6281	246.8
	21	65 44 51.5	5 18.05	-24.9	-0 43 43.7	+6.03	0.702 7270	+247.9
	25	66 6 3.4	5 17.90	24.7	0 43 19.6	6.05	0.702 8264	249.0
	29	66 27 14.7	5 17.76	24.6	0 42 55.3	6.07	0.702 9262	250.1
	3	66 48 25.5	5 17.61	24.5	0 42 31.0	6.09	0.703 0265	251.2
	7	67 9 35.6	5 17.46	24.3	0 42 6.6	6.12	0.703 1272	252.3
Dec.	11	67 30 45.2	5 17.32	-24.2	-0 41 42.0	+6.15	0.703 2283	+253.3
	15	67 51 54.2	5 17.17	24.0	0 41 17.4	6.17	0.703 3298	254.3
	19	68 13 2.6	5 17.01	23.9	0 40 52.7	6.19	0.703 4317	255.4
	23	68 34 10.3	5 16.86	23.7	0 40 27.9	6.20	0.703 5341	256.5
	27	68 55 17.5	5 16.72	23.6	0 40 3.1	6.22	0.703 6369	257.4
	31	69 16 24.1	5 16.56	-23.4	-0 39 38.2	+6.24	0.703 7400	+258.4
	35	69 37 30.0	5 16.41	-23.3	-0 39 13.2	+6.26	0.703 8436	+259.5

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	"	'	"	"			"	"	h m
Jan.	1	8	2 25.24	-0.792	+20	38	59.3	+2.59	0.909 5168	-112.3	9.54	1.09	13 17.8
	2	8	2 6.13	0.800	20	40	1.7	2.61	0.909 2552	105.6	9.55	1.09	13 13.5
	3	8	1 46.84	0.808	20	41	4.5	2.62	0.909 0098	98.9	9.55	1.09	13 9.3
	4	8	1 27.37	0.814	20	42	7.6	2.64	0.908 7806	92.1	9.56	1.09	13 5.0
	5	8	1 7.75	0.821	20	43	11.0	2.65	0.908 5677	85.3	9.56	1.09	13 0.8
	6	8	0 47.98	-0.827	+20	44	14.6	+2.66	0.908 3713	- 78.4	9.57	1.09	12 56.5
	7	8	0 28.06	0.833	20	45	18.5	2.67	0.908 1915	71.5	9.57	1.09	12 52.3
	8	8	0 8.02	0.837	20	46	22.6	2.67	0.908 0283	64.5	9.57	1.09	12 48.0
	9	7	59 47.87	0.842	20	47	26.8	2.68	0.907 8819	57.5	9.58	1.09	12 43.7
	10	7	59 27.61	0.846	20	48	31.1	2.68	0.907 7521	50.6	9.58	1.09	12 39.5
	11	7	59 7.26	-0.850	+20	49	35.5	+2.69	0.907 6392	- 43.5	9.58	1.09	12 35.2
	12	7	58 46.82	0.853	20	50	40.0	2.69	0.907 5431	36.5	9.58	1.09	12 30.9
	13	7	58 26.31	0.856	20	51	44.5	2.69	0.907 4640	29.4	9.59	1.09	12 26.7
	14	7	58 5.74	0.858	20	52	49.0	2.69	0.907 4018	22.4	9.59	1.09	12 22.4
	15	7	57 45.12	0.860	20	53	53.4	2.68	0.907 3566	15.2	9.59	1.09	12 18.1
	16	7	57 24.47	-0.861	+20	54	57.7	+2.68	0.907 3286	- 8.1	9.59	1.09	12 13.8
	17	7	57 3.80	0.862	20	56	1.9	2.67	0.907 3178	- 0.9	9.59	1.09	12 9.5
	18	7	56 43.11	0.862	20	57	5.9	2.67	0.907 3242	+ 6.3	9.59	1.09	12 5.3
	19	7	56 22.43	0.862	20	58	9.7	2.65	0.907 3479	13.5	9.59	1.09	12 1.0
	20	7	56 1.75	0.861	20	59	13.3	2.64	0.907 3888	20.6	9.59	1.09	11 56.7
	21	7	55 41.11	-0.859	+21	0	16.7	+2.63	0.907 4468	+ 27.7	9.59	1.09	11 52.5
	22	7	55 20.50	0.858	21	1	19.7	2.62	0.907 5219	34.8	9.58	1.09	11 48.2
	23	7	54 59.94	0.856	21	2	22.4	2.61	0.907 6141	42.0	9.58	1.09	11 43.9
	24	7	54 39.44	0.853	21	3	24.8	2.59	0.907 7234	49.1	9.58	1.09	11 39.7
	25	7	54 19.02	0.849	21	4	26.7	2.57	0.907 8496	56.1	9.58	1.09	11 35.4
	26	7	53 58.69	-0.845	+21	5	28.2	+2.55	0.907 9928	+ 63.2	9.57	1.09	11 31.1
	27	7	53 38.46	0.840	21	6	29.2	2.53	0.908 1528	70.2	9.57	1.09	11 26.8
	28	7	53 18.35	0.836	21	7	29.7	2.51	0.908 3296	77.1	9.57	1.09	11 22.6
	29	7	52 58.36	0.830	21	8	29.6	2.48	0.908 5229	84.0	9.56	1.09	11 18.3
	30	7	52 38.51	0.824	21	9	28.9	2.46	0.908 7328	90.9	9.56	1.09	11 14.1
Feb.	31	7	52 18.81	-0.818	+21	10	27.7	+2.44	0.908 9590	+ 97.6	9.55	1.09	11 9.8
	1	7	51 59.26	0.811	21	11	25.9	2.41	0.909 2014	104.3	9.55	1.08	11 5.5
	2	7	51 39.89	0.803	21	12	23.4	2.38	0.909 4598	111.0	9.54	1.08	11 1.3
	3	7	51 20.70	0.796	21	13	20.3	2.36	0.909 7340	117.5	9.54	1.08	10 57.0
	4	7	51 1.70	0.788	21	14	16.5	2.33	0.910 0240	124.1	9.53	1.08	10 52.8
	5	7	50 42.90	-0.779	+21	15	12.0	+2.30	0.910 3296	+130.6	9.52	1.08	10 48.6
	6	7	50 24.31	0.770	21	16	6.7	2.26	0.910 6507	137.0	9.52	1.08	10 44.3
	7	7	50 5.94	0.760	21	17	0.7	2.23	0.910 9872	143.3	9.51	1.08	10 40.1
	8	7	49 47.81	0.750	21	17	53.8	2.20	0.911 3387	149.6	9.50	1.08	10 35.8
	9	7	49 29.92	0.740	21	18	46.2	2.17	0.911 7053	155.8	9.49	1.08	10 31.6
	10	7	49 12.27	-0.730	+21	19	37.8	+2.13	0.912 0866	+161.9	9.48	1.08	10 27.4
	11	7	48 54.89	0.719	21	20	28.6	2.10	0.912 4825	167.9	9.48	1.08	10 23.2
	12	7	48 37.77	0.707	21	21	18.5	2.06	0.912 8927	173.9	9.47	1.08	10 19.0
	13	7	48 20.94	0.695	21	22	7.5	2.02	0.913 3172	179.8	9.46	1.07	10 14.8
	14	7	48 4.39	0.683	21	22	55.7	1.99	0.913 7557	185.6	9.45	1.07	10 10.6
	15	7	47 48.14	-0.671	+21	23	42.9	+1.95	0.914 2081	+191.3	9.44	1.07	10 6.4
	16	7	47 32.20	-0.658	+21	24	29.2	+1.91	0.914 6740	+196.9	9.43	1.07	10 2.2

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	h	m	s		°	'	"						
Feb. 16	7	47	32.20	-0.658	+21	24	29.2	+1.91	0.914 6740	+196.9	9.43	1.07	10 2.2
17	7	47	16.57	0.644	21	25	14.6	1.87	0.915 1534	202.5	9.42	1.07	9 58.0
18	7	47	1.27	0.631	21	25	59.0	1.83	0.915 6459	207.9	9.41	1.07	9 53.8
19	7	46	46.30	0.617	21	26	42.4	1.79	0.916 1514	213.3	9.40	1.07	9 49.6
20	7	46	31.68	0.602	21	27	24.8	1.75	0.916 6697	218.5	9.38	1.07	9 45.4
21	7	46	17.40	-0.588	+21	28	6.2	+1.70	0.917 2004	+223.7	9.37	1.06	9 41.3
22	7	46	3.48	0.572	21	28	46.6	1.66	0.917 7433	228.7	9.36	1.06	9 37.1
23	7	45	49.93	0.557	21	29	26.0	1.62	0.918 2981	233.6	9.35	1.06	9 33.0
24	7	45	36.75	0.541	21	30	4.3	1.57	0.918 8646	238.4	9.34	1.06	9 28.8
25	7	45	23.95	0.525	21	30	41.5	1.53	0.919 4425	243.1	9.32	1.06	9 24.7
26	7	45	11.54	-0.509	+21	31	17.7	+1.48	0.920 0315	+247.6	9.31	1.06	9 20.5
27	7	44	59.52	0.492	21	31	52.7	1.44	0.920 6312	252.1	9.30	1.06	9 16.4
28	7	44	47.91	0.476	21	32	26.7	1.39	0.921 2415	256.4	9.29	1.05	9 12.3
Mar. 1	7	44	36.69	0.459	21	32	59.5	1.34	0.921 8619	260.6	9.27	1.05	9 8.2
2	7	44	25.88	0.442	21	33	31.2	1.30	0.922 4923	264.7	9.26	1.05	9 4.1
3	7	44	15.49	-0.424	+21	34	1.8	+1.25	0.923 1324	+268.7	9.25	1.05	9 0.0
4	7	44	5.51	0.407	21	34	31.3	1.21	0.923 7820	272.5	9.23	1.05	8 55.9
5	7	43	55.96	0.389	21	34	59.7	1.16	0.924 4406	276.3	9.22	1.05	8 51.8
6	7	43	46.84	0.371	21	35	27.0	1.11	0.925 1081	279.9	9.20	1.05	8 47.7
7	7	43	38.15	0.353	21	35	53.1	1.06	0.925 7841	283.4	9.19	1.04	8 43.6
8	7	43	29.89	-0.335	+21	36	18.1	+1.02	0.926 4683	+286.8	9.18	1.04	8 39.6
9	7	43	22.07	0.317	21	36	42.0	0.97	0.927 1605	290.0	9.16	1.04	8 35.5
10	7	43	14.69	0.298	21	37	4.8	0.92	0.927 8605	293.2	9.15	1.04	8 31.4
11	7	43	7.75	0.280	21	37	26.4	0.88	0.928 5680	296.3	9.13	1.04	8 27.4
12	7	43	1.26	0.261	21	37	46.8	0.83	0.929 2826	299.2	9.12	1.04	8 23.4
13	7	42	55.22	-0.242	+21	38	6.1	+0.78	0.930 0043	+302.1	9.10	1.03	8 19.3
14	7	42	49.64	0.223	21	38	24.3	0.73	0.930 7326	304.8	9.09	1.03	8 15.3
15	7	42	44.51	0.204	21	38	41.3	0.68	0.931 4673	307.4	9.07	1.03	8 11.3
16	7	42	39.83	0.185	21	38	57.1	0.64	0.932 2081	309.9	9.06	1.03	8 7.3
17	7	42	35.62	0.166	21	39	11.8	0.59	0.932 9549	312.3	9.04	1.03	8 3.3
18	7	42	31.87	-0.147	+21	39	25.3	+0.54	0.933 7072	+314.6	9.02	1.03	7 59.3
19	7	42	28.58	0.128	21	39	37.6	0.49	0.934 4649	316.8	9.01	1.02	7 55.3
20	7	42	25.76	0.108	21	39	48.8	0.44	0.935 2276	318.8	8.99	1.02	7 51.4
21	7	42	23.41	0.088	21	39	58.8	0.39	0.935 9951	320.7	8.98	1.02	7 47.4
22	7	42	21.53	0.068	21	40	7.6	0.34	0.936 7671	322.5	8.96	1.02	7 43.4
23	7	42	20.13	-0.049	+21	40	15.2	+0.29	0.937 5433	+324.2	8.94	1.02	7 39.5
24	7	42	19.19	0.029	21	40	21.7	0.24	0.938 3234	326.8	8.93	1.01	7 35.5
25	7	42	18.73	-0.010	21	40	26.9	0.19	0.939 1071	327.2	8.91	1.01	7 31.6
26	7	42	18.74	+0.010	21	40	31.0	0.15	0.939 8941	328.6	8.90	1.01	7 27.6
27	7	42	19.22	0.030	21	40	33.9	0.10	0.940 6842	329.8	8.88	1.01	7 23.7
28	7	42	20.18	+0.049	+21	40	35.6	+0.05	0.941 4770	+330.8	8.86	1.01	7 19.8
29	7	42	21.60	0.069	21	40	36.1	0.00	0.942 2723	331.8	8.85	1.01	7 15.9
30	7	42	23.50	0.089	21	40	35.5	-0.05	0.943 0697	332.7	8.83	1.00	7 12.0
31	7	42	25.87	0.109	21	40	33.7	0.10	0.943 8691	333.4	8.82	1.00	7 8.1
Apr. 1	7	42	28.70	0.128	21	40	30.7	0.15	0.944 6702	334.1	8.80	1.00	7 4.3
2	7	42	32.00	+0.147	+21	40	26.6	-0.20	0.945 4727	+334.6	8.78	1.00	7 0.4
3	7	42	35.77	+0.167	+21	40	21.3	-0.24	0.946 2764	+335.1	8.77	1.00	6 56.5

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.																																					
	h	m	s									h	m	s																																		
Apr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	May	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	7 42 28.70	7 42 32.00	7 42 35.77	7 42 40.00	7 42 44.69	7 42 49.84	7 42 55.44	7 43 1.50	7 43 8.01	7 43 14.97	7 43 22.38	7 43 30.23	7 43 38.53	7 43 47.28	7 43 56.46	7 44 6.09	7 44 16.15	7 44 26.64	7 44 37.56	7 44 48.91	7 45 0.68	7 45 12.88	7 45 25.49	7 45 38.52	7 45 51.96	7 46 5.80	7 46 20.04	7 46 34.68	7 46 49.72	7 47 5.14	7 47 20.94	7 47 37.13	7 47 53.69	7 48 10.62	7 48 27.91	7 48 45.57	7 49 3.59	7 49 21.96	7 49 40.67	7 49 59.74	7 50 19.14	7 50 38.89	7 50 58.96	7 51 19.37	7 51 40.10	7 52 1.16	7 52 22.53	
	+0.128	0.147	0.167	0.186	0.205	+0.224	0.243	0.262	0.281	0.299	+0.318	0.337	0.355	0.374	0.392	+0.410	0.428	0.446	0.464	0.482	+0.499	0.517	0.534	0.551	0.568	+0.585	0.602	0.618	0.635	0.650	+0.667	0.682	0.698	0.713	0.728	+0.743	0.758	0.773	0.787	0.802	+0.816	0.830	0.843	0.857	0.871	+0.884	+0.897	
	+21 40 30.7	21 40 26.6	21 40 21.3	21 40 14.9	21 40 7.3	+21 39 58.5	21 39 48.6	21 39 37.6	21 39 25.4	21 39 12.1	+21 38 57.6	21 38 42.1	21 38 25.4	21 38 7.6	21 37 48.7	+21 37 28.6	21 37 7.4	21 36 45.0	21 36 21.5	21 35 56.9	+21 35 31.1	21 35 4.3	21 34 36.3	21 34 7.2	21 33 37.1	+21 33 5.8	21 32 33.4	21 31 59.9	21 31 25.3	21 30 49.7	+21 30 13.0	21 29 35.2	21 28 56.4	21 28 16.5	21 27 35.6	+21 26 53.6	21 26 10.6	21 25 26.5	21 24 41.4	21 23 55.3	+21 23 8.1	21 22 19.9	21 21 30.6	21 20 40.3	21 19 49.0	+21 18 56.7	+21 18 3.4	
	-0.15	0.20	0.24	0.29	0.34	-0.39	0.44	0.48	0.53	0.58	-0.62	0.67	0.72	0.76	0.81	-0.86	0.91	0.96	1.00	1.05	-1.10	1.14	1.19	1.23	1.28	-1.33	1.37	1.42	1.46	1.51	-1.55	1.60	1.64	1.68	1.73	-1.77	1.81	1.86	1.90	1.94	-1.99	2.03	2.07	2.12	2.16	-2.20	-2.24	
	0.944 6702	0.945 4727	0.946 2764	0.947 0811	0.947 8866	0.948 6925	0.949 4987	0.950 3050	0.951 1111	0.951 9169	0.952 7221	0.953 5266	0.954 3301	0.955 1325	0.955 9334	0.956 7328	0.957 5303	0.958 3257	0.959 1189	0.959 9096	0.960 6977	0.961 4829	0.962 2649	0.963 0437	0.963 8190	0.964 5906	0.965 3583	0.966 1220	0.966 8816	0.967 6368	0.968 3875	0.969 1335	0.969 8747	0.970 6109	0.971 3421	0.972 0681	0.972 7888	0.973 5039	0.974 2134	0.974 9172	0.975 6151	0.976 3071	0.976 9929	0.977 6726	0.978 3459	0.979 0128	0.979 6730	
	+334.1	334.6	335.1	335.4	335.7	+335.8	335.9	335.9	335.8	335.6	+335.4	335.0	334.6	334.0	333.4	+332.7	331.9	331.0	330.0	328.9	+327.8	326.5	325.2	323.8	322.3	+320.7	319.0	317.4	315.6	313.7	+311.8	309.8	307.8	305.7	303.6	+301.4	299.1	296.8	294.4	292.0	+289.6	287.0	284.5	281.9	279.2	+276.5	+273.7	
	8.80	8.78	8.77	8.75	8.73	8.72	8.70	8.68	8.67	8.65	8.64	8.62	8.60	8.59	8.57	8.56	8.54	8.53	8.51	8.49	8.48	8.47	8.45	8.43	8.42	8.40	8.39	8.37	8.36	8.35	8.33	8.32	8.30	8.29	8.27	8.26	8.25	8.23	8.22	8.21	8.19	8.18	8.17	8.16	8.14	8.13	8.12	
	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.96	0.96	0.96	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.93	0.93	0.93	0.92	0.92	0.92			
	7 4.3	7 0.4	6 56.5	6 52.6	6 48.8	6 44.9	6 41.1	6 37.3	6 33.5	6 29.6	6 25.8	6 22.0	6 18.2	6 14.5	6 10.7	6 6.9	6 3.1	5 59.4	5 55.6	5 51.9	5 48.2	5 44.4	5 40.7	5 37.0	5 33.3	5 29.6	5 25.9	5 22.2	5 18.5	5 14.9	5 11.2	5 7.5	5 3.9	5 0.2	4 56.6	4 52.9	4 49.3	4 45.7	4 42.1	4 38.5	4 34.8	4 31.2	4 27.6	4 24.0	4 20.4	4 16.9	4 13.3	

# SATURN, 1917.

## GREENWICH MEAN TIME.

187

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.	
	Noon.				Noon.									
	h	m	s	s	"	"	"	"			"	"	h	m
May	17	7 52	22.53	+0.897	+21 18	3.4	-2.24	0.979 6730	+273.7	8.12	0.92	4 13.3		
	18	7 52	44.22	0.910	21 17	9.1	2.28	0.980 3264	270.8	8.10	0.92	4 9.7		
	19	7 53	6.21	0.923	21 16	13.7	2.33	0.980 9730	267.9	8.09	0.92	4 6.1		
	20	7 53	28.51	0.935	21 15	17.4	2.37	0.981 6125	265.0	8.08	0.92	4 2.6		
	21	7 53	51.11	0.948	21 14	20.0	2.41	0.982 2448	262.0	8.07	0.92	3 59.0		
	22	7 54	14.01	+0.960	+21 13	21.6	-2.45	0.982 8699	+258.9	8.06	0.92	3 55.5		
	23	7 54	37.19	0.972	21 12	22.3	2.49	0.983 4877	255.9	8.05	0.91	3 52.0		
	24	7 55	0.66	0.984	21 11	22.0	2.53	0.984 0981	252.7	8.04	0.91	3 48.4		
	25	7 55	24.41	0.995	21 10	20.7	2.57	0.984 7008	249.5	8.02	0.91	3 44.9		
	26	7 55	48.43	1.007	21 9	18.5	2.61	0.985 2959	246.4	8.01	0.91	3 41.3		
	27	7 56	12.72	+1.018	+21 8	15.3	-2.65	0.985 8833	+243.1	8.00	0.91	3 37.8		
June	1	7 56	37.28	1.029	21 7	11.2	2.69	0.986 4629	239.8	7.99	0.91	3 34.3		
	2	7 57	2.09	1.039	21 6	6.1	2.73	0.987 0345	236.5	7.98	0.91	3 30.8		
	3	7 57	27.16	1.050	21 5	0.1	2.77	0.987 5980	233.1	7.97	0.91	3 27.2		
	4	7 57	52.48	1.060	21 3	53.1	2.81	0.988 1534	229.7	7.96	0.90	3 23.7		
	5	7 58	18.04	+1.070	+21 2	45.3	-2.84	0.988 7006	+226.3	7.95	0.90	3 20.2		
	6	7 58	43.84	1.080	21 1	36.6	2.88	0.989 2396	222.9	7.94	0.90	3 16.7		
	7	7 59	9.88	1.090	21 0	27.0	2.92	0.989 7703	219.4	7.93	0.90	3 13.2		
	8	7 59	36.14	1.099	20 59	16.4	2.96	0.990 2926	215.9	7.92	0.90	3 9.7		
	9	8 0	2.63	1.108	20 58	5.0	2.99	0.990 8066	212.4	7.91	0.90	3 6.2		
	10	8 0	29.34	+1.117	+20 56	52.7	-3.03	0.991 3122	+208.9	7.90	0.90	3 2.7		
	11	8 0	56.27	1.126	20 55	39.5	3.07	0.991 8093	205.3	7.89	0.90	2 59.3		
	12	8 1	23.41	1.135	20 54	25.5	3.10	0.992 2978	201.8	7.89	0.90	2 55.8		
	13	8 1	50.77	1.144	20 53	10.5	3.14	0.992 7777	198.1	7.88	0.89	2 52.3		
	14	8 2	18.32	1.152	20 51	54.7	3.18	0.993 2489	194.5	7.87	0.89	2 48.8		
	15	8 2	46.08	+1.161	+20 50	38.0	-3.21	0.993 7112	+190.8	7.86	0.89	2 45.4		
	16	8 3	14.03	1.169	20 49	20.5	3.25	0.994 1647	187.1	7.85	0.89	2 41.9		
	17	8 3	42.17	1.177	20 48	2.1	3.28	0.994 6093	183.4	7.84	0.89	2 38.4		
	18	8 4	10.50	1.184	20 46	42.9	3.32	0.995 0448	179.6	7.83	0.89	2 35.0		
	19	8 4	39.02	1.192	20 45	22.8	3.35	0.995 4713	175.8	7.83	0.89	2 31.5		
	20	8 5	7.71	+1.199	+20 44	2.0	-3.38	0.995 8887	+172.0	7.82	0.89	2 28.0		
	21	8 5	36.58	1.207	20 42	40.3	3.42	0.996 2968	168.1	7.81	0.89	2 24.6		
	22	8 6	5.62	1.213	20 41	17.8	3.45	0.996 6955	164.2	7.80	0.89	2 21.1		
	23	8 6	34.82	1.220	20 39	54.5	3.49	0.997 0849	160.3	7.80	0.89	2 17.7		
	24	8 7	4.18	1.227	20 38	30.4	3.52	0.997 4649	156.4	7.79	0.89	2 14.3		
	25	8 7	33.70	+1.233	+20 37	5.5	-3.55	0.997 8355	+152.4	7.78	0.88	2 10.8		
	26	8 8	3.37	1.239	20 35	39.9	3.58	0.998 1965	148.5	7.78	0.88	2 7.4		
	27	8 8	33.18	1.245	20 34	13.5	3.61	0.998 5481	144.5	7.77	0.88	2 3.9		
	28	8 9	3.13	1.251	20 32	46.4	3.65	0.998 8901	140.5	7.77	0.88	2 0.5		
	29	8 9	33.22	1.256	20 31	18.5	3.68	0.999 2224	136.5	7.76	0.88	1 57.1		
	30	8 10	3.43	+1.261	+20 29	50.0	-3.70	0.999 5451	+132.4	7.75	0.88	1 53.6		
	1	8 10	33.77	1.267	20 28	20.7	3.74	0.999 8580	128.4	7.75	0.88	1 50.2		
	2	8 11	4.23	1.272	20 26	50.7	3.77	1.000 1612	124.3	7.74	0.88	1 46.8		
	July	3	8 11	34.80	1.276	20 25	20.1	3.79	1.000 4547	120.3	7.74	0.88	1 43.4	
4		8 12	5.48	1.281	20 23	48.8	3.82	1.000 7384	116.2	7.73	0.88	1 39.9		
5		8 12	36.27	+1.285	+20 22	16.8	-3.85	1.001 0123	+112.1	7.73	0.88	1 36.5		
6		8 13	7.17	+1.289	+20 20	44.1	-3.88	1.001 2764	+108.0	7.72	0.88	1 33.1		

**GREENWICH MEAN TIME.**

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- ax.	Transit, Meridian of Green- wich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
July	h m s	s	° ' "	"			"	"	h m
	1 8 12 36.27	+1.285	+20 22 16.8	-3.85	1.001 0123	+112.1	7.73	0.88	1 36.5
	2 8 13 7.17	1.280	20 20 44.1	3.88	1.001 2764	108.0	7.72	0.88	1 33.1
	3 8 13 38.16	1.293	20 19 10.8	3.90	1.001 5307	103.9	7.72	0.88	1 29.7
	4 8 14 9.24	1.297	20 17 36.9	3.92	1.001 7752	99.8	7.71	0.88	1 26.3
	5 8 14 40.42	1.301	20 16 2.4	3.95	1.002 0099	95.7	7.71	0.87	1 22.8
	6 8 15 11.68	+1.304	+20 14 27.2	-3.98	1.002 2346	+ 91.6	7.71	0.87	1 19.4
	7 8 15 43.02	1.307	20 12 51.5	4.00	1.002 4495	87.5	7.70	0.87	1 16.0
	8 8 16 14.43	1.310	20 11 15.1	4.03	1.002 6544	83.3	7.70	0.87	1 12.6
	9 8 16 45.92	1.314	20 9 38.1	4.05	1.002 8493	79.1	7.70	0.87	1 9.2
	10 8 17 17.49	1.317	20 8 0.6	4.08	1.003 0342	75.0	7.69	0.87	1 5.8
	11 8 17 49.12	+1.319	+20 6 22.5	-4.10	1.003 2091	+ 70.8	7.69	0.87	1 2.4
	12 8 18 20.80	1.321	20 4 43.8	4.12	1.003 3739	66.6	7.69	0.87	0 59.0
	13 8 18 52.55	1.324	20 3 4.6	4.14	1.003 5286	62.4	7.68	0.87	0 55.6
	14 8 19 24.35	1.326	20 1 24.9	4.17	1.003 6732	58.1	7.68	0.87	0 52.2
	15 8 19 56.21	1.328	19 59 44.6	4.19	1.003 8077	53.9	7.68	0.87	0 48.8
	16 8 20 28.10	+1.330	+19 58 3.9	-4.21	1.003 9319	+ 49.6	7.68	0.87	0 45.4
	17 8 21 0.04	1.331	19 56 22.7	4.23	1.004 0459	45.4	7.67	0.87	0 42.0
	18 8 21 32.01	1.333	19 54 41.0	4.25	1.004 1496	41.1	7.67	0.87	0 38.6
	19 8 22 4.01	1.334	19 52 58.9	4.26	1.004 2431	36.8	7.67	0.87	0 35.2
	20 8 22 36.03	1.335	19 51 16.3	4.28	1.004 3262	32.5	7.67	0.87	0 31.8
	21 8 23 8.07	+1.335	+19 49 33.3	-4.30	1.004 3989	+ 28.2	7.67	0.87	0 28.3
	22 8 23 40.13	1.336	19 47 49.9	4.32	1.004 4613	23.9	7.67	0.87	0 24.9
	23 8 24 12.21	1.336	19 46 6.1	4.33	1.004 5134	19.6	7.67	0.87	0 21.5
	24 8 24 44.28	1.336	19 44 22.0	4.35	1.004 5552	15.3	7.67	0.87	0 18.2
	25 8 25 16.36	1.336	19 42 37.5	4.36	1.004 5868	11.0	7.67	0.87	0 14.8
	26 8 25 48.43	+1.336	+19 40 52.6	-4.38	1.004 6082	+ 6.8	7.66	0.87	0 11.4
	27 8 26 20.50	1.336	19 39 7.5	4.39	1.004 6194	+ 2.5	7.66	0.87	0 7.9
	28 8 26 52.55	1.335	19 37 22.0	4.40	1.004 6203	- 1.8	7.66	0.87	0 4.5
	29 8 27 24.59	1.335	19 35 36.2	4.41	1.004 6109	6.1	7.66	0.87	0 1.1
	30 8 27 56.61	1.334	19 33 50.1	4.43	1.004 5912	10.3	7.67	0.87	23 54.3
31 8 28 28.61	+1.333	+19 32 3.8	-4.44	1.004 5613	- 14.6	7.67	0.87	23 50.9	
Aug.	1 8 29 0.58	1.331	19 30 17.2	4.45	1.004 5211	18.9	7.67	0.87	23 47.5
	2 8 29 32.51	1.330	19 28 30.4	4.46	1.004 4707	23.1	7.67	0.87	23 44.1
	3 8 30 4.41	1.328	19 26 43.3	4.46	1.004 4102	27.4	7.67	0.87	23 40.7
	4 8 30 36.27	1.327	19 24 56.1	4.47	1.004 3394	31.6	7.67	0.87	23 37.3
	5 8 31 8.09	+1.325	+19 23 8.7	-4.48	1.004 2584	- 35.9	7.67	0.87	23 33.9
	6 8 31 39.86	1.323	19 21 21.1	4.49	1.004 1672	40.1	7.67	0.87	23 30.5
	7 8 32 11.59	1.321	19 19 33.4	4.49	1.004 0658	44.4	7.67	0.87	23 27.1
	8 8 32 43.25	1.318	19 17 45.5	4.50	1.003 9542	48.6	7.68	0.87	23 23.7
	9 8 33 14.86	1.316	19 15 57.5	4.50	1.003 8324	52.9	7.68	0.87	23 20.3
	10 8 33 46.41	+1.313	+19 14 9.4	-4.51	1.003 7003	- 57.2	7.68	0.87	23 16.9
	11 8 34 17.89	1.310	19 12 21.2	4.51	1.003 5579	61.4	7.68	0.87	23 13.5
	12 8 34 49.29	1.307	19 10 32.9	4.51	1.003 4054	65.7	7.68	0.87	23 10.0
	13 8 35 20.62	1.304	19 8 44.6	4.51	1.003 2427	69.9	7.69	0.87	23 6.6
	14 8 35 51.87	1.300	19 6 56.2	4.51	1.003 0698	74.2	7.69	0.87	23 3.2
	15 8 36 23.03	+1.297	+19 5 7.9	-4.51	1.002 8867	- 78.4	7.70	0.87	22 59.8
	16 8 36 54.10	+1.293	+19 3 19.5	-4.51	1.002 6935	- 82.6	7.70	0.87	22 56.4

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.		
	Noon.				Noon.										
	h	m	s	s	°	'	"	"					h	m	
Aug.	16	8	36	54.10	+1.293	+19	3	19.5	-4.51	1.002 6935	- 82.6	7.70	0.87	22 56.4	
	17	8	37	25.07	1.289	19	1	31.3	4.51	1.002 4900	86.9	7.70	0.87	22 53.0	
	18	8	37	55.95	1.284	18	50	43.1	4.51	1.002 2762	91.2	7.71	0.87	22 49.6	
	19	8	38	26.72	1.280	18	57	55.0	4.50	1.002 0523	96.4	7.71	0.87	22 46.1	
	20	8	38	57.38	1.275	18	56	7.0	4.50	1.001 8183	99.6	7.71	0.88	22 42.7	
	21	8	39	27.93	+1.270	+18	54	19.1	-4.49	1.001 5742	-103.8	7.72	0.88	22 39.3	
	22	8	39	58.36	1.265	18	52	31.4	4.49	1.001 3202	107.9	7.72	0.88	22 35.8	
	23	8	40	28.67	1.260	18	50	43.8	4.48	1.001 0562	112.1	7.73	0.88	22 32.4	
	24	8	40	58.86	1.255	18	48	56.4	4.47	1.000 7823	116.2	7.73	0.88	22 29.0	
	25	8	41	28.91	1.249	18	47	9.2	4.46	1.000 4985	120.3	7.74	0.88	22 25.5	
	26	8	41	58.82	+1.243	+18	45	22.3	-4.45	1.000 2048	-124.4	7.74	0.88	22 22.1	
	27	8	42	28.59	1.238	18	43	35.6	4.44	0.999 9013	128.5	7.75	0.88	22 18.6	
	28	8	42	58.22	1.231	18	41	49.1	4.43	0.999 5881	132.5	7.75	0.88	22 15.2	
	29	8	43	27.70	1.225	18	40	3.0	4.41	0.999 2651	136.6	7.76	0.88	22 11.8	
	30	8	43	57.03	1.219	18	38	17.2	4.40	0.998 9325	140.6	7.76	0.88	22 8.3	
	31	8	44	26.21	+1.212	+18	36	31.7	-4.39	0.998 5903	-144.6	7.77	0.88	22 4.9	
	Sept.	1	8	44	55.22	1.205	18	34	46.6	4.37	0.998 2386	148.6	7.78	0.88	22 1.4
		2	8	45	24.07	1.199	18	33	1.8	4.36	0.997 8772	152.6	7.78	0.88	21 58.0
		3	8	45	52.76	1.192	18	31	17.4	4.34	0.997 5063	156.5	7.79	0.88	21 54.5
		4	8	46	21.27	1.184	18	29	33.5	4.32	0.997 1259	160.5	7.80	0.88	21 51.0
5		8	46	49.61	+1.177	+18	27	50.0	-4.30	0.996 7360	-164.4	7.80	0.89	21 47.6	
6		8	47	17.77	1.170	18	26	6.9	4.29	0.996 3368	168.3	7.81	0.89	21 44.1	
7		8	47	45.75	1.162	18	24	24.3	4.26	0.995 9282	172.2	7.82	0.89	21 40.6	
8		8	48	13.53	1.154	18	22	42.2	4.24	0.995 5102	176.1	7.83	0.89	21 37.2	
9		8	48	41.13	1.146	18	21	0.6	4.22	0.995 0829	180.0	7.83	0.89	21 33.7	
10		8	49	8.52	+1.137	+18	19	19.6	-4.20	0.994 6464	-183.8	7.84	0.89	21 30.2	
	11	8	49	35.72	1.129	18	17	39.2	4.17	0.994 2007	187.6	7.85	0.89	21 26.7	
	12	8	50	2.71	1.120	18	15	59.3	4.15	0.993 7459	191.4	7.86	0.89	21 23.2	
	13	8	50	29.49	1.111	18	14	20.2	4.12	0.993 2820	195.2	7.87	0.89	21 19.8	
	14	8	50	56.05	1.102	18	12	41.7	4.09	0.992 8091	198.9	7.87	0.90	21 16.3	
	15	8	51	22.39	+1.093	+18	11	3.9	-4.06	0.992 3272	-202.6	7.88	0.90	21 12.8	
	16	8	51	48.50	1.083	18	9	26.8	4.03	0.991 8364	206.3	7.89	0.90	21 9.3	
	17	8	52	14.39	1.074	18	7	50.4	4.00	0.991 3368	210.0	7.90	0.90	21 5.8	
	18	8	52	40.03	1.064	18	6	14.8	3.97	0.990 8284	213.6	7.91	0.90	21 2.2	
	19	8	53	5.44	1.054	18	4	40.0	3.94	0.990 3113	217.2	7.92	0.90	20 58.7	
	20	8	53	30.61	+1.044	+18	3	5.9	-3.90	0.989 7857	-220.8	7.93	0.90	20 55.2	
	21	8	53	55.53	1.033	18	1	32.8	3.86	0.989 2517	224.3	7.94	0.90	20 51.7	
	22	8	54	20.19	1.022	18	0	0.5	3.83	0.988 7093	227.7	7.95	0.90	20 48.2	
	23	8	54	44.59	1.011	17	58	29.1	3.79	0.988 1587	231.1	7.96	0.90	20 44.6	
	24	8	55	8.73	1.000	17	56	58.6	3.75	0.987 5999	234.5	7.97	0.91	20 41.1	
	25	8	55	32.61	+0.989	+17	55	29.0	-3.71	0.987 0331	-237.8	7.98	0.91	20 37.6	
	26	8	55	56.22	0.978	17	54	0.4	3.67	0.986 4583	241.1	7.99	0.91	20 34.0	
	27	8	56	19.56	0.967	17	52	32.7	3.63	0.985 8757	244.4	8.00	0.91	20 30.5	
	28	8	56	42.62	0.955	17	51	6.0	3.59	0.985 2853	247.6	8.01	0.91	20 26.9	
	29	8	57	5.40	0.943	17	49	40.4	3.54	0.984 6872	250.8	8.02	0.91	20 23.4	
	30	8	57	27.89	+0.931	+17	48	15.9	-3.50	0.984 0816	-253.9	8.04	0.91	20 19.8	
Oct.	1	8	57	50.09	+0.919	+17	46	52.4	-3.46	0.983 4685	-257.0	8.05	0.91	20 16.2	



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit. Meridian of Greenwich.	
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.		
	h	m	s	s	°	'	"	"					h	m
Oct.	1	8	57	50.09	+0.919	+17	46	52.4	-3.46	0.983 4685	-257.0	8.05	0.91	20 16.2
	2	8	58	12.01	0.907	17	45	29.9	3.41	0.982 8479	260.1	8.06	0.92	20 12.7
	3	8	58	33.62	0.894	17	44	8.6	3.36	0.982 2201	263.1	8.07	0.92	20 9.1
	4	8	58	54.94	0.882	17	42	48.5	3.32	0.981 5851	266.1	8.08	0.92	20 5.5
	5	8	59	15.95	0.869	17	41	29.5	3.27	0.980 9430	269.0	8.09	0.92	20 1.9
	6	8	59	36.66	+0.856	+17	40	11.7	-3.22	0.980 2938	-271.9	8.11	0.92	19 58.3
	7	8	59	57.05	0.843	17	38	55.1	3.17	0.979 6378	274.8	8.12	0.92	19 54.7
	8	9	0	17.13	0.830	17	37	39.7	3.11	0.978 9750	277.6	8.13	0.92	19 51.1
	9	9	0	36.88	0.816	17	36	25.6	3.06	0.978 3055	280.3	8.14	0.93	19 47.5
	10	9	0	56.31	0.802	17	35	12.8	3.01	0.977 6294	283.0	8.16	0.93	19 43.9
	11	9	1	15.40	+0.788	+17	34	1.3	-2.95	0.976 9469	-285.7	8.17	0.93	19 40.3
	12	9	1	34.15	0.774	17	32	51.2	2.89	0.976 2581	288.3	8.18	0.93	19 36.6
	13	9	1	52.57	0.760	17	31	42.4	2.84	0.975 5632	290.8	8.19	0.93	19 33.0
	14	9	2	10.64	0.746	17	30	35.0	2.78	0.974 8624	293.2	8.21	0.93	19 29.4
	15	9	2	28.36	0.731	17	29	29.0	2.72	0.974 1557	295.6	8.22	0.93	19 25.7
	16	9	2	45.72	+0.716	+17	28	24.5	-2.66	0.973 4433	-298.0	8.23	0.94	19 22.1
	17	9	3	2.73	0.701	17	27	21.5	2.59	0.972 7254	300.3	8.25	0.94	19 18.4
	18	9	3	19.38	0.686	17	26	20.0	2.53	0.972 0021	302.5	8.26	0.94	19 14.8
	19	9	3	35.67	0.671	17	25	20.0	2.47	0.971 2735	304.6	8.28	0.94	19 11.1
	20	9	3	51.58	0.655	17	24	21.6	2.40	0.970 5400	306.6	8.29	0.94	19 7.4
	21	9	4	7.12	+0.640	+17	23	24.7	-2.34	0.969 8017	-308.6	8.30	0.94	19 3.7
	22	9	4	22.28	0.624	17	22	29.4	2.27	0.969 0587	310.5	8.32	0.94	19 0.0
	23	9	4	37.07	0.608	17	21	35.6	2.21	0.968 3113	312.3	8.33	0.95	18 56.4
	24	9	4	51.47	0.592	17	20	43.5	2.14	0.967 5595	314.1	8.35	0.95	18 52.7
	25	9	5	5.49	0.576	17	19	53.0	2.07	0.966 8036	315.8	8.36	0.95	18 49.0
	26	9	5	19.12	+0.560	+17	19	4.2	-2.00	0.966 0438	-317.4	8.38	0.95	18 45.3
	27	9	5	32.36	0.543	17	18	17.0	1.93	0.965 2802	318.9	8.39	0.95	18 41.5
	28	9	5	45.20	0.527	17	17	31.5	1.86	0.964 5131	320.3	8.40	0.95	18 37.8
	29	9	5	57.65	0.510	17	16	47.7	1.79	0.963 7426	321.7	8.42	0.96	18 34.1
	30	9	6	9.70	0.494	17	16	5.6	1.72	0.962 9689	323.0	8.44	0.96	18 30.4
31	9	6	21.34	+0.476	+17	15	25.3	-1.64	0.962 1921	-324.3	8.45	0.96	18 26.6	
Nov.	1	9	6	32.57	0.460	17	14	46.7	1.57	0.961 4125	325.4	8.47	0.96	18 22.9
	2	9	6	43.40	0.443	17	14	9.9	1.50	0.960 6301	326.5	8.48	0.96	18 19.1
	3	9	6	53.82	0.425	17	13	34.8	1.42	0.959 8453	327.5	8.50	0.97	18 15.3
	4	9	7	3.82	0.408	17	13	1.6	1.35	0.959 0581	328.4	8.51	0.97	18 11.6
	5	9	7	13.40	+0.390	+17	12	30.2	-1.27	0.958 2689	-329.3	8.53	0.97	18 7.8
	6	9	7	22.56	0.373	17	12	0.6	1.19	0.957 4777	330.0	8.54	0.97	18 4.0
	7	9	7	31.29	0.355	17	11	32.9	1.11	0.956 6848	330.7	8.56	0.97	18 0.2
	8	9	7	39.60	0.337	17	11	7.1	1.04	0.955 8905	331.2	8.57	0.97	17 56.4
	9	9	7	47.47	0.319	17	10	43.2	0.96	0.955 0949	331.7	8.59	0.98	17 52.6
	10	9	7	54.91	+0.301	+17	10	21.2	-0.88	0.954 2984	-332.0	8.61	0.98	17 48.8
	11	9	8	1.91	0.283	17	10	1.1	0.80	0.953 5012	332.3	8.62	0.98	17 45.0
	12	9	8	8.48	0.265	17	9	42.9	0.72	0.952 7034	332.5	8.64	0.98	17 41.1
	13	9	8	14.61	0.246	17	9	26.7	0.63	0.951 9053	332.6	8.65	0.98	17 37.3
	14	9	8	20.29	0.228	17	9	12.5	0.55	0.951 1072	332.5	8.67	0.98	17 33.4
	15	9	8	25.53	+0.209	+17	9	0.2	-0.47	0.950 3093	-332.4	8.68	0.99	17 29.6
	16	9	8	30.33	+0.191	+17	8	49.8	-0.39	0.949 5119	-332.1	8.70	0.99	17 25.7

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.		
	Noon.				Noon.										
	h	m	s	s	°	'	"	"	Noon.	Noon.	Noon.	Noon.	Noon.	h	m
Nov. 16	9	8	30.33	+0.191	+17	8	49.8	-0.39	0.949 5119	-332.1	8.70	0.99	17 25.7		
17	9	8	34.68	0.172	17	8	41.4	0.31	0.948 7153	331.7	8.72	0.99	17 21.9		
18	9	8	38.58	0.153	17	8	35.0	0.23	0.947 9199	331.1	8.73	0.99	17 18.0		
19	9	8	42.02	0.134	17	8	30.6	0.14	0.947 1259	330.5	8.75	0.99	17 14.1		
20	9	8	45.02	0.116	17	8	28.1	-0.06	0.946 3334	329.8	8.76	1.00	17 10.2		
21	9	8	47.57	+0.097	+17	8	27.7	+0.02	0.945 5428	-329.0	8.78	1.00	17 6.3		
22	9	8	49.67	0.078	17	8	29.2	0.11	0.944 7543	328.1	8.80	1.00	17 2.4		
23	9	8	51.32	0.059	17	8	32.8	0.19	0.943 9681	327.0	8.81	1.00	16 58.5		
24	9	8	52.52	0.041	17	8	38.3	0.27	0.943 1846	325.9	8.83	1.00	16 54.6		
25	9	8	53.27	0.022	17	8	45.8	0.35	0.942 4040	324.6	8.84	1.00	16 50.7		
26	9	8	53.57	+0.003	+17	8	55.3	+0.44	0.941 6266	-323.2	8.86	1.01	16 46.8		
27	9	8	53.42	-0.015	17	9	6.7	0.52	0.940 8526	321.7	8.88	1.01	16 42.8		
28	9	8	52.82	0.034	17	9	20.1	0.60	0.940 0823	320.2	8.89	1.01	16 38.9		
29	9	8	51.77	0.053	17	9	35.4	0.68	0.939 3158	318.5	8.91	1.01	16 34.9		
30	9	8	50.27	0.072	17	9	52.7	0.76	0.938 5535	316.7	8.92	1.01	16 31.0		
Dec. 1	9	8	48.33	-0.090	+17	10	12.0	+0.85	0.937 7956	-314.8	8.94	1.02	16 27.0		
2	9	8	45.94	0.109	17	10	33.3	0.93	0.937 0424	312.8	8.95	1.02	16 23.0		
3	9	8	43.10	0.128	17	10	56.5	1.01	0.936 2942	310.6	8.97	1.02	16 19.0		
4	9	8	39.81	0.146	17	11	21.6	1.09	0.935 5514	308.4	8.99	1.02	16 15.0		
5	9	8	36.08	0.165	17	11	48.7	1.17	0.934 8141	306.0	9.00	1.02	16 11.0		
6	9	8	31.91	-0.183	+17	12	17.7	+1.25	0.934 0827	-303.5	9.02	1.02	16 7.0		
7	9	8	27.29	0.202	17	12	48.6	1.33	0.933 3574	300.9	9.03	1.03	16 3.0		
8	9	8	22.23	0.220	17	13	21.5	1.41	0.932 6385	298.1	9.05	1.03	15 59.0		
9	9	8	16.73	0.238	17	13	56.2	1.49	0.931 9264	295.2	9.06	1.03	15 55.0		
10	9	8	10.79	0.256	17	14	32.8	1.56	0.931 2213	292.2	9.07	1.03	15 50.9		
11	9	8	4.43	-0.274	+17	15	11.3	+1.64	0.930 5236	-289.2	9.09	1.03	15 46.9		
12	9	7	57.63	0.292	17	15	51.7	1.72	0.929 8335	285.9	9.10	1.03	15 42.8		
13	9	7	50.40	0.310	17	16	33.8	1.79	0.929 1514	282.5	9.12	1.04	15 38.8		
14	9	7	42.75	0.328	17	17	17.8	1.87	0.928 4776	279.0	9.13	1.04	15 34.7		
15	9	7	34.67	0.345	17	18	3.5	1.94	0.927 8123	275.4	9.15	1.04	15 30.7		
16	9	7	26.18	-0.362	+17	18	51.0	+2.01	0.927 1559	-271.6	9.16	1.04	15 26.6		
17	9	7	17.27	0.380	17	19	40.2	2.09	0.926 5086	267.8	9.17	1.04	15 22.5		
18	9	7	7.96	0.396	17	20	31.1	2.15	0.925 8708	263.7	9.19	1.04	15 18.4		
19	9	6	58.25	0.413	17	21	23.6	2.22	0.925 2427	259.6	9.20	1.05	15 14.3		
20	9	6	48.14	0.429	17	22	17.8	2.30	0.924 6246	255.4	9.21	1.05	15 10.2		
21	9	6	37.64	-0.446	+17	23	13.7	+2.36	0.924 0167	-251.1	9.23	1.05	15 6.1		
22	9	6	26.75	0.461	17	24	11.1	2.42	0.923 4194	246.6	9.24	1.05	15 2.0		
23	9	6	15.49	0.477	17	25	10.0	2.49	0.922 8328	242.1	9.25	1.05	14 57.9		
24	9	6	3.85	0.493	17	26	10.5	2.55	0.922 2573	237.4	9.26	1.05	14 53.7		
25	9	5	51.84	0.508	17	27	12.4	2.61	0.921 6931	232.7	9.28	1.05	14 49.6		
26	9	5	39.48	-0.522	+17	28	15.7	+2.67	0.921 1403	-227.9	9.29	1.06	14 45.4		
27	9	5	26.76	0.537	17	29	20.5	2.73	0.920 5993	222.9	9.30	1.06	14 41.3		
28	9	5	13.69	0.552	17	30	26.6	2.78	0.920 0702	217.9	9.31	1.06	14 37.2		
29	9	5	0.27	0.566	17	31	34.1	2.84	0.919 5533	212.8	9.32	1.06	14 33.0		
30	9	4	46.52	0.580	17	32	42.9	2.89	0.919 0489	207.5	9.33	1.06	14 28.8		
31	9	4	32.44	-0.594	+17	33	53.0	+2.95	0.918 5573	-202.1	9.34	1.06	14 24.7		
32	9	4	18.03	...	+17	35	4.4	...	0.918 0786	...	9.35	1.06	14 20.5		

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		" ' "	" "	"	" ' "	"		
Jan.	1	116 31 51.0	2 13.49	+12.2	+0 9 16.3	+5.79	0.957 1250	+04.3
	9	116 49 38.8	2 13.46	13.2	0 10 2.6	5.79	0.957 1767	65.0
	17	117 7 26.4	2 13.43	14.2	0 10 48.9	5.78	0.957 2290	65.7
	25	117 25 13.7	2 13.40	15.2	0 11 35.1	5.78	0.957 2818	66.4
Feb.	2	117 43 0.8	2 13.37	16.2	0 12 21.3	5.78	0.957 3352	67.1
	10	118 0 47.6	2 13.34	+17.2	+0 13 7.5	+5.77	0.957 3891	+67.8
	18	118 18 34.2	2 13.31	18.2	0 13 53.7	5.77	0.957 4436	68.4
	26	118 36 20.5	2 13.28	19.2	0 14 39.8	5.76	0.957 4986	69.1
Mar.	6	118 54 6.6	2 13.24	20.2	0 15 25.9	5.76	0.957 5542	69.8
	14	119 11 52.4	2 13.21	21.2	0 16 12.0	5.76	0.957 6103	70.4
	22	119 29 37.9	2 13.17	+22.1	+0 16 58.0	+5.75	0.957 6669	+71.1
	30	119 47 23.2	2 13.13	23.1	0 17 44.0	5.74	0.957 7241	71.9
Apr.	7	120 5 8.2	2 13.09	24.1	0 18 29.9	5.74	0.957 7819	72.5
	15	120 22 52.9	2 13.06	25.1	0 19 15.8	5.74	0.957 8401	73.2
	23	120 40 37.4	2 13.04	26.0	0 20 1.7	5.73	0.957 8990	73.9
May	1	120 58 21.6	2 13.01	+27.0	+0 20 47.5	+5.72	0.957 9584	+74.6
	9	121 16 5.5	2 12.97	28.0	0 21 33.2	5.71	0.958 0183	75.2
	17	121 33 49.1	2 12.94	28.9	0 22 18.9	5.71	0.958 0787	75.9
	25	121 51 32.5	2 12.91	29.9	0 23 4.6	5.71	0.958 1397	76.6
June	2	122 9 15.6	2 12.87	30.8	0 23 50.2	5.70	0.958 2012	77.2
	10	122 26 58.4	2 12.83	+31.8	+0 24 35.8	+5.69	0.958 2632	+77.8
	18	122 44 40.9	2 12.79	32.7	0 25 21.3	5.69	0.958 3258	78.5
	26	123 2 23.1	2 12.76	33.7	0 26 6.8	5.68	0.958 3888	79.1
July	4	123 20 5.0	2 12.72	34.6	0 26 52.2	5.67	0.958 4523	79.7
	12	123 37 46.6	2 12.69	35.6	0 27 37.5	5.67	0.958 5163	80.4
	20	123 55 28.0	2 12.65	+36.5	+0 28 22.9	+5.66	0.958 5809	+81.0
	28	124 13 9.0	2 12.61	37.4	0 29 8.1	5.65	0.958 6459	81.6
Aug.	5	124 30 49.7	2 12.57	38.4	0 29 53.3	5.64	0.958 7115	82.2
	13	124 48 30.1	2 12.54	39.3	0 30 38.4	5.63	0.958 7775	82.9
	21	125 6 10.3	2 12.50	40.2	0 31 23.4	5.62	0.958 8441	83.6
	29	125 23 50.1	2 12.46	+41.1	+0 32 8.4	+5.62	0.958 9112	+84.1
Sept.	6	125 41 29.6	2 12.42	42.0	0 32 53.3	5.61	0.958 9787	84.7
	14	125 59 8.8	2 12.38	42.9	0 33 38.2	5.60	0.959 0467	85.3
	22	126 16 47.6	2 12.34	43.8	0 34 23.0	5.59	0.959 1152	85.9
	30	126 34 26.2	2 12.30	44.7	0 35 7.7	5.59	0.959 1842	86.5
Oct.	8	126 52 4.4	2 12.26	+45.6	+0 35 52.4	+5.58	0.959 2536	+87.1
	16	127 9 42.3	2 12.22	46.5	0 36 37.0	5.57	0.959 3236	87.8
	24	127 27 19.9	2 12.18	47.4	0 37 21.5	5.56	0.959 3941	88.4
Nov.	1	127 44 57.1	2 12.13	48.2	0 38 6.0	5.55	0.959 4650	89.0
	9	128 2 34.0	2 12.09	49.1	0 38 50.3	5.54	0.959 5365	89.6
	17	128 20 10.6	2 12.06	+49.9	+0 39 34.6	+5.53	0.959 6084	+90.2
	25	128 37 46.9	2 12.01	50.8	0 40 18.8	5.52	0.959 6809	90.9
Dec.	3	128 55 22.8	2 11.97	51.7	0 41 2.9	5.51	0.959 7538	91.4
	11	129 12 58.4	2 11.92	52.5	0 41 47.0	5.50	0.959 8272	92.1
	19	129 30 33.6	2 11.88	53.3	0 42 31.0	5.49	0.959 9011	92.6
	27	129 48 8.5	2 11.84	+54.2	+0 43 14.9	+5.48	0.959 9754	+93.1
	35	130 5 43.1	2 11.80	+55.0	+0 43 58.7	+5.47	0.960 0501	+93.7

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.	
	h	m	s	s	°	'	"	"			"	"	h m
Jan.	3	21 21	21.53	+11.851	-16 11	12.3		+55.96	1.317 1981	+2099.8	1.62	0.43	2 30.8
	7	21 22	9.72	12.239	16 7	24.6		57.83	1.317 9972	1895.1	1.61	0.42	2 15.9
	11	21 22	59.38	12.584	16 3	29.9		59.52	1.318 7134	1684.8	1.61	0.42	2 1.0
	15	21 23	50.33	12.886	15 59	28.7		61.03	1.319 3442	1468.1	1.61	0.42	1 46.1
	19	21 24	42.41	13.147	15 55	21.9		62.34	1.319 8871	1245.5	1.60	0.42	1 31.2
	23	21 25	35.44	+13.358	-15 51	10.2		+63.47	1.320 3399	+1017.5	1.60	0.42	1 16.4
	27	21 26	29.21	13.519	15 46	54.5		64.33	1.320 7006	785.6	1.60	0.42	1 1.6
	31	21 27	23.53	13.632	15 42	35.9		64.95	1.320 9682	552.6	1.60	0.42	0 46.7
Feb.	4	21 28	18.20	13.698	15 38	15.2		65.37	1.321 1426	319.1	1.60	0.42	0 31.9
	8	21 29	13.05	13.718	15 33	53.2		65.60	1.321 2234	+ 85.0	1.60	0.42	0 17.0
	12	21 30	7.89	+13.696	-15 29	30.7		+65.61	1.321 2106	- 148.9	1.60	0.42	0 2.1
	16	21 31	2.56	13.630	15 25	8.6		65.99	1.321 1044	381.9	1.60	0.42	23 43.7
	20	21 31	56.87	13.518	15 20	47.9		64.96	1.320 9052	614.3	1.60	0.42	23 28.9
	24	21 32	50.64	13.357	15 16	29.3		64.27	1.320 6133	844.3	1.60	0.42	23 14.1
	28	21 33	43.66	13.145	15 12	14.1		63.33	1.320 2304	1069.3	1.60	0.42	22 59.2
Mar.	4	21 34	35.75	+12.895	-15 8	2.9		+62.21	1.319 7586	-1288.8	1.61	0.42	22 44.4
	8	21 35	26.77	12.607	15 3	56.7		60.86	1.319 2001	1502.7	1.61	0.42	22 29.5
	12	21 36	16.55	12.278	14 59	56.3		59.33	1.318 5572	1710.7	1.61	0.42	22 14.6
	16	21 37	4.94	11.909	14 56	2.4		57.57	1.317 8323	1913.0	1.61	0.42	21 59.6
	20	21 37	51.77	11.502	14 52	16.0		55.61	1.317 0277	2108.8	1.62	0.42	21 44.7
	24	21 38	36.90	+11.054	-14 48	37.8		+53.42	1.316 1464	-2296.1	1.62	0.42	21 29.7
	28	21 39	20.15	10.565	14 45	8.9		51.03	1.315 1922	2473.1	1.62	0.43	21 14.7
Apr.	1	21 40	1.38	10.046	14 41	49.8		48.46	1.314 1694	2638.7	1.63	0.43	20 59.6
	5	21 40	40.48	9.496	14 38	41.4		45.73	1.313 0826	2794.1	1.63	0.43	20 44.5
	9	21 41	17.31	8.917	14 35	44.1		42.86	1.311 9355	2939.3	1.63	0.43	20 29.4
	13	21 41	51.79	+ 8.314	-14 32	58.7		+39.81	1.310 7327	-3072.7	1.64	0.43	20 14.3
	17	21 42	23.78	7.678	14 30	25.8		36.61	1.309 4789	3194.6	1.64	0.43	19 59.1
	21	21 42	53.18	7.017	14 28	6.0		33.25	1.308 1787	3304.0	1.65	0.43	19 43.8
	25	21 43	19.88	6.329	14 26	0.0		29.75	1.306 8377	3398.1	1.65	0.43	19 28.5
	29	21 43	43.79	5.624	14 24	8.1		26.18	1.305 4622	3477.2	1.66	0.43	19 13.2
May	3	21 44	4.85	+ 4.903	-14 22	30.7		+22.51	1.304 0579	-3541.5	1.66	0.44	18 57.8
	7	21 44	23.00	4.172	14 21	8.1		18.79	1.302 6310	3590.7	1.67	0.44	18 42.3
	11	21 44	38.21	3.430	14 20	0.5		14.98	1.301 1873	3625.5	1.68	0.44	18 26.9
	15	21 44	50.42	2.674	14 19	8.3		11.12	1.299 7326	3645.7	1.68	0.44	18 11.3
	19	21 44	59.59	1.908	14 18	31.6		7.23	1.298 2730	3648.8	1.69	0.44	17 55.7
	23	21 45	5.68	+ 1.138	-14 18	10.5		+ 3.30	1.296 8159	-3634.0	1.69	0.44	17 40.1
	27	21 45	8.70	+ 0.373	14 18	5.2		- 0.61	1.295 3681	3601.9	1.70	0.45	17 24.4
	31	21 45	8.67	- 0.386	14 18	15.3		4.45	1.293 9367	3552.1	1.70	0.45	17 8.7
June	4	21 45	5.62	1.137	14 18	40.7		8.24	1.292 5285	3487.1	1.71	0.45	16 52.9
	8	21 44	59.59	1.876	14 19	21.1		11.95	1.291 1492	3405.9	1.71	0.45	16 37.0
	12	21 44	50.63	- 2.602	-14 20	16.2		-15.60	1.289 8060	-3308.2	1.72	0.45	16 21.1
	16	21 44	38.79	3.316	14 21	25.8		19.16	1.288 5049	3194.0	1.72	0.45	16 5.2
	20	21 44	24.13	4.007	14 22	49.3		22.59	1.287 2532	3061.2	1.73	0.45	15 49.2
	24	21 44	6.77	4.670	14 24	26.3		25.86	1.286 0581	2912.4	1.73	0.45	15 33.2
	28	21 43	46.81	5.301	14 26	15.9		28.91	1.284 9253	2748.2	1.74	0.46	15 17.2
July	2	21 43	24.41	- 5.894	-14 28	17.3		-31.77	1.283 8614	-2570.0	1.74	0.46	15 1.1
	6	21 42	59.70	- 6.455	-14 30	29.8		-34.43	1.282 8710	-2379.2	1.75	0.46	14 44.9

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.	
	h	m	s		°	'	"							h
July	2	21	43	24.41	-5.894	-14	28	17.3	-31.77	1.283 8614	-2570.0	1.74	0.46	15 1.1
	6	21	42	59.70	6.455	14	30	29.8	34.43	1.282 8710	2379.2	1.75	0.46	14 44.9
	10	21	42	32.82	6.977	14	32	52.5	36.89	1.281 9598	2175.1	1.75	0.46	14 28.7
	14	21	42	3.94	7.458	14	35	24.6	39.12	1.281 1326	1958.6	1.75	0.46	14 12.5
	18	21	41	33.22	7.892	14	38	5.1	41.08	1.280 3946	1729.3	1.76	0.46	13 56.3
	22	21	41	0.87	-8.274	-14	40	52.9	-42.76	1.279 7506	-1489.0	1.76	0.46	13 40.0
	26	21	40	27.10	8.599	14	43	46.8	44.15	1.279 2046	1239.9	1.76	0.46	13 23.7
	30	21	39	52.15	8.868	14	46	45.7	45.22	1.278 7596	984.0	1.76	0.46	13 7.4
Aug.	3	21	39	16.23	9.080	14	49	48.2	46.01	1.278 4180	723.8	1.77	0.46	12 51.1
	7	21	38	39.58	9.238	14	52	53.4	46.51	1.278 1812	458.4	1.77	0.46	12 34.8
	11	21	38	2.40	-9.339	-14	56	0.0	-46.72	1.278 0518	-188.8	1.77	0.46	12 18.4
	15	21	37	24.95	9.377	14	59	6.8	46.63	1.278 0305	+ 83.7	1.77	0.46	12 2.1
	19	21	36	47.47	9.351	15	2	12.6	46.20	1.278 1188	356.5	1.77	0.46	11 45.7
	23	21	36	10.23	9.269	15	5	16.0	45.45	1.278 3155	627.5	1.77	0.46	11 29.4
	27	21	35	33.48	9.104	15	8	15.8	44.40	1.278 6204	895.7	1.76	0.46	11 13.0
	31	21	34	57.48	-8.888	-15	11	10.8	-43.05	1.279 0313	+1157.4	1.76	0.46	10 56.7
Sept.	4	21	34	22.45	8.618	15	13	59.9	41.48	1.279 5455	1412.7	1.76	0.46	10 40.4
	8	21	33	48.61	8.208	15	16	42.3	39.65	1.280 1606	1661.9	1.76	0.46	10 24.1
	12	21	33	16.18	7.910	15	19	16.7	37.50	1.280 8740	1903.9	1.76	0.46	10 7.9
	16	21	32	45.41	7.468	15	21	42.0	35.13	1.281 6824	2135.9	1.75	0.46	9 51.7
	20	21	32	16.51	-6.972	-15	23	57.4	-32.51	1.282 5810	+2354.7	1.75	0.46	9 35.5
	24	21	31	49.70	6.428	15	26	1.8	29.68	1.283 5644	2500.6	1.74	0.46	9 19.3
	28	21	31	25.14	5.844	15	27	54.6	26.68	1.284 6275	2751.5	1.74	0.46	9 3.1
Oct.	2	21	31	3.00	5.220	15	29	35.0	23.52	1.285 7636	2927.5	1.74	0.46	8 47.0
	6	21	30	43.43	4.561	15	31	2.5	20.20	1.286 9676	3089.6	1.73	0.45	8 31.0
	10	21	30	26.56	-3.867	-15	32	16.4	-16.75	1.288 2332	+3236.3	1.73	0.45	8 15.0
	14	21	30	12.54	3.139	15	33	16.3	13.16	1.289 5544	3366.2	1.72	0.45	7 59.0
	18	21	30	1.48	2.387	15	34	1.5	9.44	1.290 9237	3477.4	1.72	0.45	7 43.1
	22	21	29	53.47	1.616	15	34	31.7	5.64	1.292 3338	3569.9	1.71	0.45	7 27.3
	26	21	29	48.59	0.828	15	34	46.6	-1.83	1.293 7771	3643.3	1.70	0.45	7 11.5
	30	21	29	46.86	-0.034	-15	34	46.3	+1.99	1.295 2461	+3699.3	1.70	0.45	6 55.7
Nov.	3	21	29	48.33	+0.768	15	34	30.6	5.86	1.296 7342	3737.8	1.69	0.44	6 40.0
	7	21	29	53.01	1.572	15	33	59.4	9.75	1.298 2340	3758.6	1.69	0.44	6 24.4
	11	21	30	0.91	2.379	15	33	12.6	13.64	1.299 7387	3761.8	1.68	0.44	6 8.8
	15	21	30	12.04	3.186	15	32	10.3	17.51	1.301 2410	3746.7	1.67	0.44	5 53.2
	19	21	30	26.38	+3.961	-15	30	52.6	+21.33	1.302 7335	+3712.3	1.67	0.44	5 37.7
	23	21	30	43.86	4.756	15	29	19.8	25.04	1.304 2085	3660.3	1.66	0.44	5 22.3
	27	21	31	4.40	5.512	15	27	32.4	28.67	1.305 6596	3592.3	1.66	0.43	5 6.9
Dec.	1	21	31	27.93	6.260	15	25	30.5	32.24	1.307 0804	3510.1	1.65	0.43	4 51.6
	5	21	31	54.37	6.966	15	23	14.6	35.69	1.308 4656	3412.3	1.65	0.43	4 36.3
	9	21	32	23.63	+7.660	-15	20	45.1	+39.04	1.309 8082	+3299.0	1.64	0.43	4 21.1
	13	21	32	55.61	8.326	15	18	2.4	42.29	1.311 1030	3172.4	1.64	0.43	4 5.9
	17	21	33	30.19	8.968	15	15	7.0	45.38	1.312 3442	3030.8	1.63	0.43	3 50.7
	21	21	34	7.22	9.551	15	11	59.6	48.29	1.313 5259	2876.1	1.63	0.43	3 35.6
	25	21	34	46.55	10.109	15	8	40.9	51.04	1.314 6437	2711.5	1.62	0.43	3 20.5
	29	21	35	28.04	+10.629	-15	5	11.5	+53.62	1.315 6938	+2537.2	1.62	0.43	3 5.5
	33	21	36	11.52	.....	-15	1	32.3	.....	1.316 6720	.....	1.62	0.42	2 50.5

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude. Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	"	"	° ' "	"		
Jan.	5	319 19 28.8	39.13	+7.0	-0 42 15.4	-0.22	1.300 2137	+18.8
	15	319 26 0.1	39.13	7.0	0 42 17.6	0.22	1.300 2325	18.8
	25	319 32 31.4	39.12	7.0	0 42 19.8	0.21	1.300 2513	18.8
Feb.	4	319 39 2.6	39.12	+7.0	-0 42 21.9	-0.21	1.300 2700	+18.7
	14	319 45 33.7	39.11	6.9	0 42 24.0	0.21	1.300 2886	18.6
	24	319 52 4.8	39.11	6.9	0 42 26.1	0.21	1.300 3071	18.6
Mar.	6	319 58 35.9	39.10	+6.9	-0 42 28.2	-0.21	1.300 3257	+18.5
	16	320 5 6.9	39.10	6.9	0 42 30.3	0.21	1.300 3441	18.4
	26	320 11 37.9	39.10	6.8	0 42 32.4	0.21	1.300 3624	18.3
Apr.	5	320 18 8.8	39.09	+6.8	-0 42 34.5	-0.21	1.300 3806	+18.2
	15	320 24 39.7	39.09	6.8	0 42 36.6	0.21	1.300 3989	18.2
	25	320 31 10.5	39.08	6.8	0 42 38.6	0.20	1.300 4171	18.1
May	5	320 37 41.3	39.08	+6.7	-0 42 40.7	-0.20	1.300 4352	+18.0
	15	320 44 12.0	39.07	6.7	0 42 42.7	0.20	1.300 4531	17.9
	25	320 50 42.7	39.07	6.7	0 42 44.8	0.20	1.300 4710	17.9
June.	4	320 57 13.4	39.06	+6.7	-0 42 46.8	-0.20	1.300 4889	+17.8
	14	321 3 44.0	39.06	6.6	0 42 48.8	0.20	1.300 5067	17.8
	24	321 10 14.6	39.06	6.6	0 42 50.8	0.20	1.300 5244	17.7
July	4	321 16 45.1	39.05	+6.6	-0 42 52.8	-0.20	1.300 5421	+17.7
	14	321 23 15.6	39.05	6.6	0 42 54.8	0.20	1.300 5597	17.6
	24	321 29 46.1	39.04	6.5	0 42 56.8	0.20	1.300 5772	17.5
Aug.	3	321 36 16.5	39.04	+6.5	-0 42 58.8	-0.20	1.300 5947	+17.5
	13	321 42 46.8	39.03	6.5	0 43 0.8	0.19	1.300 6121	17.4
	23	321 49 17.1	39.03	6.4	0 43 2.7	0.19	1.300 6295	17.3
Sept.	2	321 55 47.4	39.02	+6.4	-0 43 4.6	-0.19	1.300 6468	+17.3
	12	322 2 17.6	39.02	6.4	0 43 6.5	0.19	1.300 6640	17.2
	22	322 8 47.8	39.02	6.4	0 43 8.5	0.19	1.300 6811	17.1
Oct.	2	322 15 18.0	39.01	+6.4	-0 43 10.4	-0.19	1.300 6982	+17.1
	12	322 21 48.1	39.01	6.3	0 43 12.3	0.19	1.300 7152	17.0
	22	322 28 18.1	39.00	6.3	0 43 14.2	0.19	1.300 7322	16.9
Nov.	1	322 34 48.1	39.00	+6.3	-0 43 16.1	-0.19	1.300 7491	+16.8
	11	322 41 18.1	39.00	6.2	0 43 17.9	0.18	1.300 7658	16.7
	21	322 47 48.1	38.99	6.2	0 43 19.8	0.18	1.300 7826	16.7
Dec.	1	322 54 18.0	38.99	+6.2	-0 43 21.6	-0.18	1.300 7993	+16.6
	11	323 0 47.8	38.98	6.2	0 43 23.5	0.18	1.300 8159	16.6
	21	323 7 17.6	38.98	6.1	0 43 25.3	0.18	1.300 8324	16.5
	31	323 13 47.4	38.97	+6.1	-0 43 27.2	-0.18	1.300 8489	+16.5
	41	323 20 17.1	38.97	+6.1	-0 43 29.0	-0.18	1.300 8654	+16.4

## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.		
	Noon.				Noon.										
	h	m	s	s	°	'	"	"					h	m	
Jan.	3	8 25	19.89	-6.346	+19	0	58.6	+22.35	1.463 9859	- 944.7	1.33	0.30	13	32.9	
	7	8 24	54.08	6.554	19	2	29.4	23.04	1.463 6430	770.4	1.33	0.30	13	16.7	
	11	8 24	27.51	6.722	19	4	2.7	23.57	1.463 3701	592.4	1.33	0.30	13	0.6	
	15	8 24	0.36	6.849	19	5	37.8	23.97	1.463 1697	409.3	1.33	0.30	12	44.4	
	19	8 23	32.78	6.930	19	7	14.3	24.24	1.463 0430	223.7	1.33	0.30	12	28.2	
	23	8 23	4.98	-6.964	+19	8	51.5	+24.31	1.462 9910	- 36.1	1.33	0.30	12	12.0	
	27	8 22	37.13	6.960	19	10	28.6	24.22	1.463 0141	+ 151.1	1.33	0.30	11	55.8	
	31	8 22	9.44	6.888	19	12	5.1	23.99	1.463 1116	336.2	1.33	0.30	11	39.7	
	Feb.	4	8 21	42.08	6.783	19	13	40.3	23.60	1.463 2827	519.0	1.33	0.30	11	23.5
		8	8 21	15.23	6.637	19	15	13.7	23.07	1.463 5263	697.9	1.33	0.30	11	7.3
12		8 20	49.04	-6.448	+19	16	44.7	+22.39	1.463 8404	+ 871.9	1.33	0.30	10	51.1	
16		8 20	23.70	6.218	19	18	12.7	21.61	1.464 2233	1042.5	1.33	0.30	10	35.0	
20		8 19	59.35	5.948	19	19	37.4	20.68	1.464 6736	1207.0	1.33	0.30	10	18.9	
	24	8 19	36.17	5.636	19	20	58.0	19.62	1.465 1879	1363.9	1.32	0.30	10	2.8	
	28	8 19	14.31	5.288	19	22	14.2	18.46	1.465 7635	1511.8	1.32	0.30	9	46.7	
	Mar.	4	8 18	53.91	-4.907	+19	23	25.5	+17.18	1.466 3960	+1649.7	1.32	0.30	9	30.6
		8	8 18	35.09	4.498	19	24	31.5	15.83	1.467 0820	1778.5	1.32	0.30	9	14.6
		12	8 18	17.96	4.063	19	25	32.0	14.39	1.467 8175	1897.7	1.32	0.30	8	58.6
16		8 18	2.62	3.604	19	26	26.5	12.87	1.468 5988	2007.1	1.31	0.30	8	42.6	
20		8 17	49.16	3.123	19	27	14.9	11.28	1.469 4217	2105.2	1.31	0.30	8	26.6	
	24	8 17	37.67	-2.616	+19	27	56.7	+ 9.63	1.470 2815	+2192.5	1.31	0.30	8	10.7	
	28	8 17	28.25	2.094	19	28	31.9	7.92	1.471 1740	2267.1	1.31	0.30	7	54.9	
	Apr.	1	8 17	20.93	1.564	19	29	0.2	6.19	1.472 0935	2328.9	1.30	0.30	7	39.0
		5	8 17	15.75	1.023	19	29	21.4	4.44	1.473 0356	2379.6	1.30	0.30	7	23.2
		9	8 17	12.75	-0.478	19	29	35.7	2.70	1.473 9956	2418.1	1.30	0.30	7	7.4
13		8 17	11.93	+0.070	+19	29	42.9	+ 0.89	1.474 9686	+2445.7	1.29	0.29	6	51.7	
17		8 17	13.32	0.625	19	29	42.8	- 0.93	1.475 9507	2462.5	1.29	0.29	6	36.0	
	21	8 17	16.93	1.179	19	29	35.4	2.74	1.476 9370	2467.2	1.29	0.29	6	20.3	
	25	8 17	22.75	1.730	19	29	20.9	4.52	1.477 9228	2459.5	1.29	0.29	6	4.7	
	29	8 17	30.76	2.272	19	28	59.2	6.32	1.478 9030	2439.8	1.28	0.29	5	49.1	
	May	3	8 17	40.91	+2.802	+19	28	30.4	- 8.07	1.479 8732	+2409.2	1.28	0.29	5	33.5
		7	8 17	53.16	3.321	19	27	54.7	9.78	1.480 8291	2369.3	1.28	0.29	5	18.0
11		8 18	7.46	3.826	19	27	12.2	11.47	1.481 7674	2320.6	1.27	0.29	5	2.5	
15		8 18	23.75	4.318	19	26	23.0	13.13	1.482 6842	2261.5	1.27	0.29	4	47.1	
19		8 18	41.99	4.798	19	25	27.2	14.75	1.483 5753	2192.5	1.27	0.29	4	31.6	
	23	8 19	2.11	+5.258	+19	24	25.1	-16.31	1.484 4370	+2114.5	1.27	0.29	4	16.2	
	27	8 19	24.03	5.698	19	23	16.8	17.82	1.485 2657	2027.6	1.26	0.29	4	0.9	
	31	8 19	47.66	6.111	19	22	2.6	19.26	1.486 0580	1932.7	1.26	0.29	3	45.6	
	June	4	8 20	12.89	6.501	19	20	42.8	20.63	1.486 8110	1830.7	1.26	0.29	3	30.2
		8	8 20	39.64	6.870	19	19	17.6	21.95	1.487 5217	1722.5	1.26	0.29	3	14.9
12		8 21	7.82	+7.217	+19	17	47.3	-23.20	1.488 1882	+1608.9	1.26	0.29	2	59.7	
16		8 21	37.34	7.537	19	16	12.1	24.39	1.488 8079	1487.9	1.25	0.29	2	44.5	
20		8 22	8.08	7.830	19	14	32.3	25.49	1.489 3777	1360.7	1.25	0.28	2	29.3	
	24	8 22	39.94	8.095	19	12	48.3	26.49	1.489 8958	1228.5	1.25	0.28	2	14.1	
	28	8 23	12.80	8.331	19	11	0.5	27.40	1.490 3599	1091.5	1.25	0.28	1	58.9	
	July	2	8 23	46.55	+8.536	+19	9	9.2	-28.23	1.490 7686	+ 951.4	1.25	0.28	1	43.7
		6	8 24	21.05	+8.710	+19	7	14.8	-28.96	1.491 1207	+ 809.2	1.25	0.28	1	28.6



## GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.			Var. per Day.	Apparent Declination.			Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi- diam- eter.	Hor. Paral- lax.	Transit, Meridian of Green- wich.		
	Noon.			Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	Noon.			
	h	m	s	s	°	'	"	"			"	"	h	m	
July	2	8 23	46.55	+8.536	+19	9	9.2	-28.23	1.490 7686	+ 951.4	1.25	0.28	1	43.7	
	6	8 24	21.05	8.710	19	7	14.8	28.96	1.491 1207	809.2	1.25	0.28	1	28.6	
	10	8 24	56.20	8.861	19	5	17.6	29.63	1.491 4155	663.5	1.25	0.28	1	13.4	
	14	8 25	31.90	8.983	19	3	17.9	30.19	1.491 6511	514.7	1.25	0.28	0	58.3	
	18	8 26	8.02	9.073	19	1	16.2	30.66	1.491 8269	363.3	1.25	0.28	0	43.1	
	22	8 26	44.44	+9.129	+18	59	12.8	-30.99	1.491 9415	+ 210.2	1.25	0.28	0	28.0	
	26	8 27	21.02	9.153	18	57	8.4	31.22	1.491 9950	+ 56.8	1.25	0.28	0	12.9	
	30	8 27	57.62	9.145	18	55	3.2	31.34	1.491 9869	- 97.0	1.25	0.28	23	54.0	
	Aug.	3	8 28	34.13	9.108	18	52	57.8	31.37	1.491 9176	248.8	1.25	0.28	23	38.9
		7	8 29	10.45	9.047	18	50	52.4	31.29	1.491 7879	400.6	1.25	0.28	23	23.7
11		8 29	46.46	+8.952	+18	48	47.6	-31.11	1.491 5971	- 552.9	1.25	0.28	23	8.6	
15		8 30	22.02	8.824	18	46	43.7	30.79	1.491 3458	703.3	1.25	0.28	22	53.4	
19		8 30	57.01	8.665	18	44	41.4	30.37	1.491 0348	851.4	1.25	0.28	22	38.3	
	23	8 31	31.30	8.475	18	42	40.9	29.83	1.490 6651	996.1	1.25	0.28	22	23.1	
	27	8 32	4.77	8.255	18	40	42.9	29.15	1.490 2384	1137.1	1.25	0.28	22	7.9	
	31	8 32	37.30	+8.007	+18	38	47.8	-28.38	1.489 7560	-1273.9	1.25	0.28	21	52.8	
	Sept.	4	8 33	8.79	7.733	18	36	56.0	27.52	1.489 2199	1406.0	1.25	0.28	21	37.6
		8	8 33	39.13	7.433	18	35	7.8	26.55	1.488 6318	1533.7	1.25	0.29	21	22.3
12		8 34	8.22	7.105	18	33	23.8	25.43	1.487 9936	1656.8	1.26	0.29	21	7.1	
16		8 34	35.93	6.746	18	31	44.5	24.22	1.487 3072	1773.8	1.26	0.29	20	51.8	
20		8 35	2.15	+6.360	+18	30	10.2	-22.91	1.486 5756	-1883.1	1.26	0.29	20	36.5	
	24	8 35	26.78	5.952	18	28	41.4	21.46	1.485 8018	1964.4	1.26	0.29	20	21.2	
	28	8 35	49.74	5.523	18	27	18.6	19.95	1.484 9892	2077.5	1.27	0.29	20	5.9	
	Oct.	2	8 36	10.94	5.074	18	26	1.9	18.36	1.484 1409	2162.6	1.27	0.29	19	50.5
		6	8 36	30.31	4.607	18	24	51.8	16.69	1.483 2602	2239.9	1.27	0.29	19	35.1
		10	8 36	47.77	+4.119	+18	23	48.5	-14.93	1.482 3502	-2306.0	1.27	0.29	19	19.6
14		8 37	3.24	3.613	18	22	52.5	13.07	1.481 4152	2365.8	1.28	0.29	19	4.1	
18		8 37	16.65	3.089	18	22	4.0	11.16	1.480 4590	2413.1	1.28	0.29	18	48.6	
	22	8 37	27.94	2.555	18	21	23.3	9.19	1.479 4863	2448.5	1.28	0.29	18	33.1	
	26	8 37	37.08	2.014	18	20	50.5	7.19	1.478 5017	2472.5	1.28	0.29	18	17.5	
	30	8 37	44.04	+1.465	+18	20	25.8	- 5.15	1.477 5098	-2485.4	1.29	0.29	18	1.9	
	Nov.	3	8 37	48.79	0.911	18	20	9.3	3.10	1.476 5148	2487.8	1.29	0.29	17	46.2
		7	8 37	51.32	+0.353	18	20	1.0	- 1.03	1.475 5212	2477.7	1.29	0.29	17	30.5
11		8 37	51.61	-0.206	18	20	1.1	+ 1.08	1.474 5343	2455.1	1.30	0.29	17	14.8	
15		8 37	49.67	0.765	18	20	9.6	3.17	1.473 5588	2420.0	1.30	0.30	16	59.0	
19		8 37	45.50	-1.316	+18	20	26.4	+ 5.22	1.472 6001	-2371.4	1.30	0.30	16	43.2	
	23	8 37	39.16	1.855	18	20	51.3	7.23	1.471 6634	2310.1	1.30	0.30	16	27.4	
	27	8 37	30.68	2.381	18	21	24.2	9.20	1.470 7536	2237.3	1.31	0.30	16	11.5	
	Dec.	1	8 37	20.13	2.891	18	22	4.8	11.09	1.469 8751	2153.2	1.31	0.30	15	55.6
		5	8 37	7.57	3.387	18	22	52.8	12.92	1.469 0326	2057.7	1.31	0.30	15	39.7
		9	8 36	53.06	-3.861	+18	23	48.1	+14.69	1.468 2305	-1950.4	1.32	0.30	15	23.7
13		8 36	36.71	4.312	18	24	50.2	16.36	1.467 4739	1830.8	1.32	0.30	15	7.7	
17		8 36	18.60	4.735	18	25	58.8	17.91	1.466 7673	1700.8	1.32	0.30	14	51.7	
	21	8 35	58.87	5.126	18	27	13.3	19.33	1.466 1146	1560.7	1.32	0.30	14	35.6	
	25	8 35	37.64	5.481	18	28	33.3	20.62	1.465 5199	1412.1	1.32	0.30	14	19.5	
	29	8 35	15.07	-5.794	+18	29	58.1	+21.77	1.464 9859	-1256.6	1.33	0.30	14	3.4	
	33	8 34	51.29	....	+18	31	27.3	....	1.464 5158	....	1.33	0.30	13	47.3	

## FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ' "	"	"	° ' "	"		
Jan.	5	123 22 54.7	21.74	-12.8	-0 13 53.4	+0.67	1.477 4598	+4.8
	15	123 26 32.1	21.74	12.7	0 13 46.7	0.67	1.477 4647	4.8
	25	123 30 9.5	21.74	12.6	0 13 40.0	0.67	1.477 4695	4.8
Feb.	4	123 33 47.0	21.74	-12.5	-0 13 33.3	+0.67	1.477 4743	+4.8
	14	123 37 24.4	21.74	12.4	0 13 26.7	0.67	1.477 4792	4.8
	24	123 41 1.8	21.74	12.3	0 13 20.0	0.67	1.477 4840	4.8
Mar.	6	123 44 39.2	21.74	-12.2	-0 13 13.4	+0.67	1.477 4889	+4.8
	16	123 48 16.7	21.74	12.1	0 13 6.7	0.67	1.477 4937	4.8
	26	123 51 54.1	21.74	12.0	0 13 0.1	0.67	1.477 4986	4.8
Apr.	5	123 55 31.6	21.74	-11.9	-0 12 53.4	+0.67	1.477 5034	+4.8
	15	123 59 9.0	21.74	11.8	0 12 46.7	0.67	1.477 5082	4.8
	25	124 2 46.5	21.74	11.7	0 12 40.0	0.67	1.477 5130	4.8
May	5	124 6 23.9	21.74	-11.6	-0 12 33.4	+0.67	1.477 5178	+4.8
	15	124 10 1.4	21.74	11.5	0 12 26.7	0.67	1.477 5226	4.8
	25	124 13 38.8	21.74	11.4	0 12 20.0	0.67	1.477 5274	4.8
June	4	124 17 16.3	21.74	-11.3	-0 12 13.3	+0.67	1.477 5322	+4.8
	14	124 20 53.7	21.75	11.2	0 12 6.7	0.67	1.477 5370	4.8
	24	124 24 31.2	21.75	11.1	0 12 0.0	0.67	1.477 5418	4.8
July	4	124 28 8.6	21.75	-11.0	-0 11 53.3	+0.67	1.477 5466	+4.8
	14	124 31 46.1	21.75	10.9	0 11 46.6	0.67	1.477 5513	4.8
	24	124 35 23.5	21.75	10.8	0 11 39.9	0.67	1.477 5561	4.8
Aug.	3	124 39 1.0	21.75	-10.7	-0 11 33.2	+0.67	1.477 5609	+4.8
	13	124 42 38.5	21.75	10.6	0 11 26.5	0.67	1.477 5657	4.8
	23	124 46 16.0	21.75	10.5	0 11 19.8	0.67	1.477 5704	4.8
Sept.	2	124 49 53.4	21.75	-10.4	-0 11 13.2	+0.67	1.477 5752	+4.7
	12	124 53 30.9	21.75	10.3	0 11 6.5	0.67	1.477 5799	4.7
	22	124 57 8.4	21.75	10.2	0 10 59.8	0.67	1.477 5847	4.7
Oct.	2	125 0 45.9	21.75	-10.1	-0 10 53.1	+0.67	1.477 5894	+4.7
	12	125 4 23.3	21.75	10.0	0 10 46.4	0.67	1.477 5941	4.7
	22	125 8 0.8	21.75	9.9	0 10 39.7	0.67	1.477 5988	4.7
Nov.	1	125 11 38.3	21.75	- 9.8	-0 10 33.0	+0.67	1.477 6035	+4.7
	11	125 15 15.8	21.75	9.7	0 10 26.3	0.67	1.477 6082	4.7
	21	125 18 53.3	21.75	9.6	0 10 19.7	0.67	1.477 6129	4.7
Dec.	1	125 22 30.8	21.75	- 9.5	-0 10 13.0	+0.67	1.477 6176	+4.7
	11	125 26 8.3	21.75	9.4	0 10 6.3	0.67	1.477 6223	4.7
	21	125 29 45.8	21.75	9.3	0 9 59.6	0.67	1.477 6269	4.7
	31	125 33 23.3	21.75	- 9.2	-0 9 52.9	+0.67	1.477 6316	+4.7
	41	125 37 0.8	21.75	- 9.1	-0 9 46.2	+0.67	1.477 6362	+4.6

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**PART II.**

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**ASTRONOMICAL EPHEMERIS FOR THE  
MERIDIAN OF WASHINGTON.**

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## 200 FORMULÆ FOR THE REDUCTION OF STARS, 1917.

The constants of precession, nutation and aberration adopted by the *Conférence Internationale des Étoiles Fondamentales* which met in Paris in May, 1896, are given on page xviii, and together with the notation of BESSEL are used in the formulæ which follow.

### BESSELIAN STAR-NUMBERS.

<i>Terms of Long Period.</i>	<i>Terms of Short Period.</i>
$A = \tau - 0.342\ 20 \sin \Omega$	$-0.004\ 05 \sin 2\ \mathcal{C}$
$+ 0.004\ 15 \sin 2\ \Omega$	$+0.000\ 23 \sin (\mathcal{C} + \Gamma')$
$- 0.025\ 26 \sin 2\ L$	$+0.001\ 34 \sin (\mathcal{C} - \Gamma')$
$+ 0.002\ 51 \sin (L - \Gamma)$	$-0.000\ 68 \sin (2\ \mathcal{C} - \Omega)$
$- 0.000\ 99 \sin (3\ L - \Gamma')$	$-0.000\ 52 \sin (3\ \mathcal{C} - \Gamma')$
$+ 0.000\ 42 \sin (L + \Gamma)$	$+0.000\ 30 \sin (\mathcal{C} - 2\ L + \Gamma')$
$+ 0.000\ 25 \sin (2\ L - \Omega)$	$+0.000\ 12 \sin 2\ (\mathcal{C} - L)$
$B = - 9.210 \cos \Omega$	$-0.088 \cos 2\ \mathcal{C}$
$+ 0.090 \cos 2\ \Omega$	$-0.018 \cos (2\ \mathcal{C} - \Omega)$
$- 0.552 \cos 2\ L$	$-0.011 \cos (3\ \mathcal{C} - \Gamma')$
$- 0.022 \cos (3\ L - \Gamma')$	$+0.005 \cos (\mathcal{C} + \Gamma')$
$+ 0.009 \cos (L + \Gamma)$	
$+ 0.007 \cos (2\ L - \Omega)$	
$C = -20.4700 \cos \omega \cos \odot$	
$D = -20.4700 \sin \odot$	
$E = - 0.0416 \sin \Omega + 0''.0005 \sin 2\ \Omega - 0''.0031 \sin 2\ L$	

### BESSEL'S Star-Constants.

$a = 3''.072\ 65 + 1''.336\ 36 \sin \alpha_0 \tan \delta_0$	$a' = 20''.0454 \cos \alpha_0$
$b = \frac{1}{15} \cos \alpha_0 \tan \delta_0$	$b' = -\sin \alpha_0$
$c = \frac{1}{15} \cos \alpha_0 \sec \delta_0$	$c' = \tan \omega \cos \delta_0 - \sin \alpha_0 \sin \delta_0$
$d = \frac{1}{15} \sin \alpha_0 \sec \delta_0$	$d' = \cos \alpha_0 \sin \delta_0$

### Formulæ for reduction to Apparent Position.

$$\alpha = \alpha_0 + \tau \mu + Aa + Bb + Cc + Dd + \frac{1}{15}E \quad (\text{in time})$$

$$\delta = \delta_0 + \tau \mu' + Aa' + Bb' + Cc' + Dd' \quad (\text{in arc})$$

### INDEPENDENT STAR-NUMBERS.

$$f + f' = +46''.0898\ A + E \quad (\text{in arc})$$

$$= +3''.07265\ A + \frac{1}{15}E \quad (\text{in time})$$

$$f' = -0''.0124 \sin 2\ \mathcal{C} + 0''.0041 \sin (\mathcal{C} - \Gamma') + 0''.0007 \sin (\mathcal{C} + \Gamma')$$

$$- 0''.0021 \sin (2\ \mathcal{C} - \Omega) - 0''.0016 \sin (3\ \mathcal{C} - \Gamma')$$

$$+ 0''.0009 \sin (\mathcal{C} - 2\ L + \Gamma') + 0''.0004 \sin 2\ (\mathcal{C} - L)$$

$$g \sin G = B \quad h \sin H = C \quad i = C \tan \omega$$

$$g \cos G = 20''.0454\ A \quad h \cos H = D$$

### Formulæ for Reduction to Apparent Position.

$$\alpha = \alpha_0 + f + f' + \tau \mu + \frac{1}{15}g \sin (G + \alpha_0) \tan \delta_0 + \frac{1}{15}h \sin (H + \alpha_0) \sec \delta_0 \quad (\text{in time})$$

$$\delta = \delta_0 + \tau \mu' + g \cos (G + \alpha_0) \sin \delta_0 + h \cos (H + \alpha_0) \sin \delta_0 + i \cos \delta_0 \quad (\text{in arc})$$

In the above formulæ,

$\tau$  denotes the time reckoned in units of one year, from the beginning of the Besselian fictitious year (1917, January 0<sup>d</sup>.217, Washington mean time),

$\alpha_0, \delta_0$ , the star's mean R. A. and Decl. at the beginning of the fictitious year,  
 $\alpha, \delta$ , the star's apparent right ascension and declination at the time  $\tau$ ,  
 $\mu, \mu'$ , the annual proper motion in right ascension and declination,

$\odot$ , the Sun's true longitude,  
 $L$ , the Sun's mean longitude,  
 $\Omega$ , the longitude of the Moon's ascending node,

$\omega$ , the obliquity of the ecliptic,  
 $\Gamma$ , the long. of the Sun's perigee,  
 $\Gamma'$ , the long. of the Moon's perigee,  
 $\mathcal{C}$ , the Moon's mean longitude.

The independent star-numbers are more convenient than BESSEL's when only one or two apparent positions of a star are required, or when BESSEL's star-constants are not known with sufficient accuracy.

In using the star-constants of the *British Association Catalogue*,  $a, b, c, d, a', b', c', d'$ , with the star-numbers of this Ephemeris, the quantities to be computed are  $Ac, Bd, Ca, Db, -Ac', -Bd', -Ca' - Db'$ .

In the computation of the Besselian star-numbers given for Washington mean midnight of each day of the year, on pages 202-205, the short-period terms—that is, the terms involving the Moon's mean longitude—have been included.

In the computation of the independent star-numbers, pages 206-213, the short-period terms have been included in the two columns headed  $G$  and  $\text{Log } g$ . The quantities  $f$  and  $f'$  give separately the effect of the long-period and short-period terms.  $f'$  differs but slightly from the quantity  $-0''.1866 \sin 2 \zeta + 0''.0622 \sin (\zeta - I'')$  given on page 37 of the *Procès-Verbaux* of the Paris Conference of 1896, which quantity that conference decided should be omitted in the reduction of stars from mean to apparent place.

In computing the ephemerides of the circumpolar stars in this volume, all short-period terms have been included. The quantity  $f'$ , which was omitted from the ephemerides of the circumpolar stars given in the *American Ephemeris and Nautical Almanac* for the years 1900 to 1915, inclusive, is now included in these ephemerides in accordance with the decision of the *Congrès International des Éphémérides Astronomiques* held at Paris in October, 1911. See page 43 of *Procès-Verbaux* of that Congress.

In the computation of the ephemerides of the ten-day stars, no short-period terms have been included. These terms attain two maxima and two minima during the tropical month. At maximum and minimum they may amount in right ascension to  $\pm 0''.008 \tan \delta$ , and in declination to  $\pm 0''.13$ . For computing the effect of these terms for the correction of the positions of stars interpolated from the ten-day ephemerides, the following formulæ may be used, in which  $\Delta\alpha$  and  $\Delta\delta$  denote the effect of the short-period terms in right ascension and declination, respectively, and  $\delta''\psi$  and  $\delta''\omega$ , the sum of the short-period terms of the nutation in longitude and obliquity:

$$\begin{aligned}\Delta\alpha &= D_{\psi}\alpha \delta''\psi + D_{\omega}\alpha \delta''\omega \\ \Delta\delta &= D_{\psi}\delta \delta''\psi + D_{\omega}\delta \delta''\omega\end{aligned}$$

The values of  $\delta''\psi$  and of  $\delta''\omega$  for Washington mean midnight are given for each day of the year on pages 215-216, and have been computed as follows:

$$\delta''\psi = 50''.37 A,$$

$$\delta''\omega = -B,$$

in which  $A$ , and  $B$ , are the sums of the short-period terms given in the expressions for  $A$  and  $B$  on page 200.

The quantities  $D_{\psi}\alpha$ ,  $D_{\omega}\alpha$ ,  $D_{\psi}\delta$ , and  $D_{\omega}\delta$  are given for each ten-day star on pages 316-513, and have been computed by means of the following formulæ:

$$\begin{aligned}D_{\psi}\alpha &= \frac{1}{15} (\cos \omega + \sin \alpha \tan \delta \sin \omega) & D_{\omega}\alpha &= -\frac{1}{15} \cos \alpha \tan \delta \\ D_{\psi}\delta &= \cos \alpha \sin \omega & D_{\omega}\delta &= \sin \alpha\end{aligned}$$

In the *Star List of the American Ephemeris* for the years 1910 and 1911 and in the *American Ephemeris and Nautical Almanac* for the years 1912 to 1915, inclusive, the value used for the derivative of the right ascension with reference to  $\psi$  was

$$D'_{\psi}\alpha = \frac{1}{15} \sin \alpha \tan \delta \sin \omega$$

and the addition of the term  $\frac{1}{15} \cos \omega$  is made in accordance with the above-mentioned decision of the *Congrès International des Éphémérides Astronomiques* of 1911 with reference to the quantity  $f'$ .

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Jan. 0	+9.51342	-0.4500	-0.52391	+1.30413	Feb. 15	+9.67399	-0.4817	-1.19718	+1.04745
1	9.51677	0.4437	0.56460	1.30267	16	9.67843	0.4821	1.20206	1.03544
2	9.52128	0.4364	0.60168	1.30105	17	9.68278	0.4858	1.20674	1.02296
3	9.52686	0.4297	0.63570	1.29930	h 18	9.68668	0.4922	1.21124	1.00998
h 4	9.53322	0.4252	0.66713	1.29740	(10.0) 19	9.68965	0.5001	1.21557	0.99647
(7.0) 5	+9.53988	-0.4235	-0.69630	+1.29535	20	+9.69167	-0.5077	-1.21971	+0.98239
6	9.54637	0.4248	0.72351	1.29316	21	9.69277	0.5136	1.22368	0.96770
7	9.55236	0.4288	0.74898	1.29082	22	9.69326	0.5167	1.22748	0.95237
8	9.55758	0.4346	0.77290	1.28832	23	9.69364	0.5164	1.23111	0.93634
9	9.56190	0.4411	0.79545	1.28568	24	9.69433	0.5133	1.23458	0.91958
10	+9.56540	-0.4474	-0.81675	+1.28288	25	+9.69562	-0.5084	-1.23788	+0.90200
11	9.56812	0.4528	0.83692	1.27992	26	9.69774	0.5029	1.24103	0.88356
12	9.57019	0.4565	0.85607	1.27681	27	9.70049	0.4983	1.24402	0.86417
13	9.57201	0.4579	0.87427	1.27354	28	9.70370	0.4958	1.24685	0.84375
14	9.57388	0.4568	0.89161	1.27010	Mar. 1	9.70697	0.4957	1.24964	0.82219
15	+9.57616	-0.4534	-0.90815	+1.26650	2	+9.71005	-0.4980	-1.25207	+0.79938
16	9.57933	0.4483	0.92395	1.26272	3	9.71271	0.5022	1.25445	0.77518
17	9.58354	0.4427	0.93906	1.25878	4	9.71483	0.5073	1.25669	0.74943
18	9.58883	0.4382	0.95353	1.25466	5	9.71635	0.5126	1.25878	0.72192
h 19	9.59493	0.4362	0.96740	1.25037	h 6	9.71730	0.5172	1.26073	0.69243
(8.0) 20	+9.60133	-0.4378	-0.98070	+1.24590	(11.0) 7	+9.71780	-0.5206	-1.26254	+0.66066
21	9.60746	0.4430	0.99348	1.24124	8	9.71798	0.5222	1.26421	0.62627
22	9.61271	0.4510	1.00575	1.23639	9	9.71806	0.5217	1.26574	0.58879
23	9.61682	0.4601	1.01756	1.23135	10	9.71829	0.5190	1.26713	0.54764
24	9.61966	0.4683	1.02891	1.22611	11	9.71893	0.5144	1.26838	0.50206
25	+9.62150	-0.4743	-1.03983	+1.22067	12	+9.72021	-0.5085	-1.26950	+0.45101
26	9.62280	0.4769	1.05036	1.21503	13	9.72228	0.5025	1.27049	0.39304
27	9.62410	0.4761	1.06049	1.20918	14	9.72507	0.4976	1.27134	0.32599
28	9.62586	0.4726	1.07026	1.20311	15	9.72839	0.4951	1.27206	0.24655
29	9.62843	0.4675	1.07968	1.19682	16	9.73182	0.4956	1.27265	0.14913
30	+9.63190	-0.4626	-1.08876	+1.19030	17	+9.73500	-0.4990	-1.27310	+0.02325
31	9.63603	0.4592	1.09752	1.18354	18	9.73753	0.5043	1.27342	9.84518
Feb. 1	9.64053	0.4583	1.10597	1.17654	19	9.73924	0.5100	1.27362	+9.53808
2	9.64504	0.4601	1.11412	1.16929	20	9.74009	0.5145	1.27368	-7.98302
h 3	9.64921	0.4645	1.12198	1.16178	h 21	9.74037	0.5164	1.27361	9.56142
(9.0) 4	+9.65284	-0.4706	-1.12957	+1.15400	(12.0) 22	+9.74039	-0.5151	-1.27341	-9.85649
5	9.65577	0.4776	1.13689	1.14595	23	9.74066	0.5106	1.27308	0.03041
6	9.65798	0.4846	1.14395	1.13761	24	9.74145	0.5038	1.27262	0.15410
7	9.65959	0.4907	1.15077	1.12897	25	9.74290	0.4960	1.27203	0.25010
8	9.66068	0.4954	1.15734	1.12002	26	9.74509	0.4884	1.27131	0.32852
9	+9.66142	-0.4980	-1.16368	+1.11075	27	+9.74775	-0.4826	-1.27046	-0.39477
10	9.66211	0.4984	1.16980	1.10114	28	9.75064	0.4792	1.26948	0.45209
11	9.66303	0.4965	1.17569	1.09117	29	9.75344	0.4784	1.26837	0.50258
12	9.66452	0.4928	1.18137	1.08084	30	9.75588	0.4797	1.26713	0.54766
13	9.66683	0.4883	1.18684	1.07012	31	9.75791	0.4824	1.26575	0.58837
14	+9.67004	-0.4841	-1.19211	+1.05900	Apr. 1	+9.75937	-0.4855	-1.26424	-0.62542
15	+9.67399	-0.4817	-1.19718	+1.04745	2	+9.76035	-0.4882	-1.26260	-0.65942

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Std. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Std. Hr.)	Log A.	Log B.	Log C.	Log D.
Apr. 1	+9.75937	-0.4855	-1.26424	-0.62542	May 17	+9.83469	-0.3062	-1.01346	-1.23314
2	9.76035	0.4882	1.26260	0.65942	18	9.83619	0.2912	1.00215	1.23785
3	9.76090	0.4898	1.26083	0.69082	19	9.83834	0.2752	0.99041	1.24239
4	9.76116	0.4897	1.25892	0.71997	20	9.84100	0.2605	0.97823	1.24675
h 5	9.76130	0.4874	1.25687	0.74714	h 21	9.84402	0.2492	0.96558	1.25096
(13.0) 6	+9.76153	-0.4827	-1.25469	-0.77258	(16.0) 22	+9.84716	-0.2424	-0.95242	-1.25499
7	9.76205	0.4758	1.25237	0.79647	23	9.85012	0.2402	0.93873	1.25887
8	9.76313	0.4672	1.24991	0.81899	24	9.85277	0.2415	0.92448	1.26259
9	9.76490	0.4580	1.24731	0.84026	25	9.85502	0.2448	0.90962	1.26616
10	9.76736	0.4494	1.24456	0.86041	26	9.85681	0.2484	0.89412	1.26957
11	+9.77036	-0.4430	-1.24167	-0.87953	27	+9.85820	-0.2510	-0.87792	-1.27284
12	9.77363	0.4397	1.23864	0.89772	28	9.85931	0.2513	0.86098	1.27596
13	9.77674	0.4401	1.23546	0.91505	29	9.86020	0.2486	0.84322	1.27894
14	9.77938	0.4430	1.23213	0.93158	30	9.86111	0.2422	0.82459	1.28177
15	9.78132	0.4471	1.22865	0.94737	31	9.86218	0.2320	0.80500	1.28446
16	+9.78252	-0.4505	-1.22501	-0.96248	June 1	+9.86355	-0.2185	-0.78438	-1.28702
17	9.78309	0.4515	1.22122	0.97696	2	9.86541	0.2025	0.76260	1.28944
18	9.78335	0.4490	1.21727	0.99083	3	9.86781	0.1863	0.73955	1.29172
19	9.78373	0.4427	1.21315	1.00415	4	9.87073	0.1723	0.71509	1.29387
h 20	9.78453	0.4332	1.20887	1.01695	h 5	9.87400	0.1631	0.68905	1.29589
(14.0) 21	+9.78596	-0.4218	-1.20443	-1.02925	(17.0) 6	+9.87736	-0.1604	-0.66122	-1.29778
22	9.78809	0.4102	1.19981	1.04108	7	9.88052	0.1642	0.63137	1.29954
23	9.79074	0.4001	1.19502	1.05247	8	9.88321	0.1723	0.59918	1.30117
24	9.79369	0.3928	1.19006	1.06344	9	9.88528	0.1817	0.56430	1.30268
25	9.79665	0.3887	1.18491	1.07401	10	9.88672	0.1889	0.52624	1.30406
26	+9.79938	-0.3875	-1.17957	-1.08420	11	+9.88774	-0.1912	-0.48439	-1.30531
27	9.80174	0.3894	1.17405	1.09403	12	9.88856	0.1871	0.43795	1.30644
28	9.80362	0.3903	1.16833	1.10351	13	9.88955	0.1764	0.38580	1.30745
29	9.80502	0.3921	1.16241	1.11266	14	9.89091	0.1607	0.32641	1.30833
30	9.80602	0.3928	1.15629	1.12150	15	9.89281	0.1426	0.25744	1.30909
May 1	+9.80675	-0.3916	-1.14996	-1.13004	16	+9.89522	-0.1255	-0.17532	-1.30973
2	9.80729	0.3879	1.14341	1.13828	17	9.89802	0.1125	0.07374	1.31025
3	9.80790	0.3814	1.13664	1.14624	18	9.90096	0.1057	9.94082	1.31065
4	9.80874	0.3720	1.12963	1.15394	19	9.90384	0.1054	9.74814	1.31093
5	9.81000	0.3602	1.12239	1.16137	h 20	9.90644	0.1107	-9.39300	1.31108
h 6	+9.81188	-0.3471	-1.11491	-1.16855	(18.0) 21	+9.90871	-0.1193	+8.81701	-1.31112
(15.0) 7	9.81438	0.3343	1.10718	1.17550	22	9.91054	0.1289	9.57789	1.31103
8	9.81741	0.3235	1.09918	1.18221	23	9.91202	0.1375	9.83943	1.31082
9	9.82077	0.3167	1.09090	1.18869	24	9.91318	0.1435	0.00142	1.31050
10	9.82412	0.3145	1.08235	1.19495	25	9.91414	0.1458	0.11901	1.31005
11	+9.82713	-0.3164	-1.07350	-1.20100	26	+9.91501	-0.1436	+0.21136	-1.30948
12	9.82953	0.3208	1.06434	1.20684	27	9.91595	0.1371	0.28735	1.30879
13	9.83128	0.3252	1.05486	1.21248	28	9.91712	0.1264	0.35190	1.30798
14	9.83237	0.3272	1.04505	1.21793	29	9.91868	0.1125	0.40796	1.30705
15	9.83307	0.3251	1.03489	1.22318	30	9.92068	0.0975	0.45750	1.30600
16	+9.83374	-0.3179	-1.02437	-1.22825	July 1	+9.92315	-0.0845	+0.50185	-1.30482
17	+9.83469	-0.3062	-1.01346	-1.23314	2	+9.92600	-0.0766	+0.54198	-1.30352



## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
July 1	+9.92315	-0.0845	+0.50185	-1.30482	Aug. 16	+9.99504	-0.2033	+1.18005	-1.08331
2	9.92600	0.0766	0.54198	1.30352	17	9.99566	0.2141	1.18531	1.07319
3	9.92898	0.0764	0.57860	1.30209	18	9.99605	0.2219	1.19039	1.06271
4	9.93190	0.0840	0.61226	1.30054	19	9.99630	0.2261	1.19529	1.05184
h 5	9.93448	0.0978	0.64338	1.29886	h 20	9.99654	0.2266	1.20002	1.04056
(19.0) 6	+9.93652	-0.1140	+0.67231	-1.29706	(23.0) 21	+9.99685	-0.2233	+1.20458	-1.02885
7	9.93800	0.1287	0.69932	1.29512	22	9.99738	0.2169	1.20897	1.01668
8	9.93902	0.1384	0.72464	1.29306	23	9.99822	0.2085	1.21319	1.00403
9	9.93976	0.1412	0.74846	1.29087	24	9.99944	0.2002	1.21726	0.99087
10	9.94053	0.1365	0.77092	1.28854	25	0.00102	0.1942	1.22116	0.97716
11	+9.94154	-0.1259	+0.79217	-1.28608	26	+0.00283	-0.1925	+1.22491	-0.96288
12	9.94298	0.1116	0.81231	1.28349	27	0.00473	0.1965	1.22851	0.94798
13	9.94487	0.0974	0.83146	1.28076	28	0.00652	0.2059	1.23196	0.93241
14	9.94714	0.0870	0.84967	1.27789	29	0.00799	0.2187	1.23525	0.91613
15	9.94962	0.0830	0.86705	1.27487	30	0.00904	0.2324	1.23840	0.89908
16	+9.95209	-0.0857	+0.88364	-1.27172	31	+0.00963	-0.2436	+1.24141	-0.88120
17	9.95436	0.0947	0.89951	1.26842	Sept. 1	0.00992	0.2502	1.24428	0.86241
18	9.95633	0.1077	0.91470	1.26497	2	0.01004	0.2510	1.24700	0.84263
19	9.95792	0.1220	0.92926	1.26138	3	0.01026	0.2461	1.24958	0.82177
20	9.95917	0.1357	0.94324	1.25763	h 4	0.01075	0.2367	1.25203	0.79971
h 21	+9.96011	-0.1467	+0.95667	-1.25372	(23.0) 5	+0.01162	-0.2253	+1.25434	-0.77632
(20.0) 22	9.96083	0.1542	0.96958	1.24966	6	0.01287	0.2149	1.25652	0.75146
23	9.96142	0.1575	0.98200	1.24544	7	0.01438	0.2077	1.25857	0.72494
24	9.96203	0.1563	0.99396	1.24106	8	0.01600	0.2055	1.26048	0.69654
25	9.96278	0.1510	1.00548	1.23650	9	0.01755	0.2084	1.26225	0.66600
26	+9.96382	-0.1425	+1.01658	-1.23178	10	+0.01888	-0.2154	+1.26390	-0.63299
27	9.96522	0.1324	1.02730	1.22688	11	0.01992	0.2245	1.26542	0.59711
28	9.96704	0.1234	1.03764	1.22180	12	0.02064	0.2338	1.26681	0.55784
29	9.96922	0.1181	1.04762	1.21654	13	0.02107	0.2417	1.26807	0.51449
30	9.97165	0.1190	1.05726	1.21109	14	0.02128	0.2471	1.26920	0.46616
31	+9.97406	-0.1270	+1.06658	-1.20545	15	+0.02133	-0.2492	+1.27020	-0.41160
Aug. 1	9.97625	0.1409	1.07558	1.19961	16	0.02135	0.2475	1.27108	0.34900
2	9.97802	0.1580	1.08428	1.19357	17	0.02142	0.2424	1.27183	0.27564
3	9.97932	0.1745	1.09270	1.18731	18	0.02167	0.2338	1.27245	0.18711
4	9.98013	0.1873	1.10084	1.18085	h 19	0.02219	0.2228	1.27294	0.07557
h 5	+9.98064	-0.1943	+1.10872	-1.17415	(0.0) 20	+0.02304	-0.2110	+1.27331	-9.92482
(21.0) 6	9.98105	0.1946	1.11633	1.16723	21	0.02423	0.2004	1.27356	9.69163
7	9.98162	0.1889	1.12370	1.16007	22	0.02571	0.1932	1.27367	-9.15193
8	9.98253	0.1791	1.13083	1.15266	23	0.02733	0.1912	1.27366	+9.31820
9	9.98386	0.1685	1.13773	1.14499	24	0.02890	0.1949	1.27352	9.74674
10	+9.98555	-0.1600	+1.14440	-1.13706	25	+0.03025	-0.2028	+1.27325	+9.95818
11	9.98747	0.1562	1.15085	1.12886	26	0.03124	0.2126	1.27286	0.09974
12	9.98944	0.1583	1.15710	1.12037	27	0.03181	0.2212	1.27294	0.20627
13	9.99128	0.1659	1.16313	1.11158	28	0.03204	0.2258	1.27169	0.29169
14	9.99286	0.1774	1.16897	1.10249	29	0.03209	0.2246	1.27091	0.36296
15	+9.99412	-0.1905	+1.17461	-1.09307	30	+0.03218	-0.2170	+1.27000	+0.42408
16	+9.99504	-0.2033	+1.18005	-1.08331	Oct. 1	+0.03250	-0.2039	+1.26896	+0.47758

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.	Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Oct. 1	+0.03250	-0.2039	+1.26896	+0.47758	Nov. 16	+0.07578	-9.5670	+1.03976	+1.22071
2	0.03316	0.1873	1.26778	0.52511	17	0.07765	9.5439	1.02892	1.22611
3	0.03423	0.1702	1.26648	0.56786	18	0.07941	9.5444	1.01765	1.23131
4	0.03560	0.1556	1.26504	0.60668	h 19	0.08095	9.5629	1.00594	1.23631
h 5	0.03715	0.1460	1.26347	0.64222	(4.0) 20	0.08211	9.5860	0.99377	1.24113
(1.0) 6	+0.03868	-0.1423	+1.26176	+0.67497	21	+0.08293	-9.6005	+0.98110	+1.24576
7	0.04005	0.1438	1.25991	0.70533	22	0.08349	9.5969	0.96790	1.25021
8	0.04115	0.1488	1.25793	0.73359	23	0.08395	9.5679	0.95415	1.25448
9	0.04196	0.1547	1.25580	0.76002	24	0.08451	9.5068	0.93981	1.25858
10	0.04248	0.1598	1.25354	0.78483	25	0.08534	9.4094	0.92483	1.26250
11	+0.04278	-0.1622	+1.25112	+0.80819	26	+0.08652	-9.2688	+0.90917	+1.26626
12	0.04292	0.1610	1.24857	0.83025	27	0.08806	9.0785	0.89278	1.26986
13	0.04301	0.1552	1.24586	0.85113	28	0.08986	8.8357	0.87559	1.27329
14	0.04313	0.1448	1.24301	0.87094	29	0.09178	8.5705	0.85755	1.27656
15	0.04340	0.1300	1.24000	0.88977	30	0.09364	8.4200	0.83859	1.27967
16	+0.04392	-0.1113	+1.23685	+0.90770	Dec. 1	+0.09532	-8.5079	+0.81860	+1.28262
17	0.04474	0.0904	1.23353	0.92481	2	0.09672	8.6739	0.79750	1.28542
18	0.04588	0.0695	1.23006	0.94115	3	0.09786	8.8089	0.77517	1.28807
19	0.04734	0.0519	1.22642	0.95678	4	0.09875	8.8837	0.75148	1.29067
h 20	0.04897	0.0404	1.22262	0.97175	h 5	0.09947	8.8998	0.72627	1.29292
(3.0) 21	+0.05063	-0.0367	+1.21865	+0.98610	(5.0) 6	+0.10007	-8.8451	+0.69935	+1.29512
22	0.05212	0.0402	1.21451	0.99987	7	0.10066	8.6712	0.67049	1.29718
23	0.05330	0.0479	1.21020	1.01309	8	0.10132	-8.0334	0.63942	1.29909
24	0.05410	0.0558	1.20571	1.02581	9	0.10214	+8.5515	0.60580	1.30086
25	0.05457	0.0592	1.20103	1.03804	10	0.10321	8.9455	0.56919	1.30248
26	+0.05481	-0.0552	+1.19617	+1.04981	11	+0.10455	+9.1495	+0.52905	+1.30396
27	0.05503	0.0416	1.19112	1.06114	12	0.10615	9.2725	0.48466	1.30580
28	0.05542	0.0187	1.18588	1.07207	13	0.10799	9.3408	0.43504	1.30650
29	0.05614	9.9884	1.18043	1.08260	14	0.10994	9.3653	0.37884	1.30756
30	0.05725	9.9543	1.17478	1.09277	15	0.11183	9.3506	0.31410	1.30849
31	+0.05871	-9.9216	+1.16891	+1.10257	16	+0.11353	+9.2997	+0.23782	+1.30927
Nov. 1	0.06038	9.8952	1.16283	1.11203	17	0.11491	9.2196	0.14504	1.30991
2	0.06213	9.8786	1.15652	1.12117	18	0.11597	9.1291	0.02671	1.31042
3	0.06376	9.8725	1.14999	1.13000	19	0.11672	9.0660	9.86332	1.31079
h 4	0.06516	9.8743	1.14321	1.13852	h 20	0.11730	9.0734	9.59804	1.31102
(3.0) 5	+0.06629	-9.8798	+1.13619	+1.14675	(6.0) 21	+0.11789	+9.1569	+8.79619	+1.31112
6	0.06712	9.8849	1.12891	1.15470	22	0.11869	9.2728	-9.43348	1.31107
7	0.06772	9.8861	1.12136	1.16239	23	0.11977	9.3820	9.78184	1.31089
8	0.06817	9.8810	1.11355	1.16981	24	0.12118	9.4669	9.97253	1.31058
9	0.06853	9.8681	1.10545	1.17698	25	0.12286	9.5224	0.10450	1.31012
10	+0.06892	-9.8460	+1.09705	+1.18391	26	+0.12469	+9.5483	-0.20546	+1.30953
11	0.06942	9.8142	1.08835	1.19060	27	0.12653	9.5479	0.28721	1.30880
12	0.07013	9.7722	1.07933	1.19706	28	0.12821	9.5240	0.35587	1.30792
13	0.07111	9.7215	1.06998	1.20329	29	0.12966	9.4817	0.41503	1.30691
14	0.07240	9.6654	1.06028	1.20931	30	0.13086	9.4278	0.46696	1.30576
15	+0.07398	-9.6108	+1.05021	+1.21511	31	+0.13179	+9.3707	-0.51322	+1.30447
16	+0.07578	-9.5670	+1.03976	+1.22071	32	+0.13252	+9.3232	-0.55491	+1.30304

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	<i>r</i>	<i>f</i>		<i>f'</i>		<i>g</i>		<i>h</i>		Log <i>g</i> .	Log <i>h</i> .	<i>i</i>	Log <i>i</i> .
		In Time.	In Time.	In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
	<i>y</i>	<i>s</i>	<i>s</i>	<i>°</i>	<i>h m</i>	<i>°</i>	<i>h m</i>	<i>°</i>	<i>h m</i>			<i>''</i>	
Jan. 0	0.0008	+1.009	-0.005	336 40.8	22 26.7	350 34.9	23 22.3	0.85244	1.31003			-1.45	-0.1612
1	0.0035	1.021	0.008	337 9.0	22 28.6	349 38.5	23 18.6	0.85427	1.30980			1.59	0.2019
2	0.0063	1.032	0.009	337 41.4	22 30.8	348 42.0	23 14.8	0.85704	1.30955			1.73	0.2390
3	0.0090	1.044	0.008	338 15.2	22 33.0	347 45.5	23 11.0	0.86093	1.30929			1.88	0.2730
4	0.0117	1.055	-0.004	338 44.7	22 35.0	346 48.9	23 7.3	0.86583	1.30900			2.02	0.3044
h (7.0) 5	0.0145	+1.067	+0.001	339 6.9	22 36.5	345 52.2	23 3.5	0.87140	1.30869			-2.16	-0.3336
6	0.0172	1.078	0.006	339 20.3	22 37.4	344 55.4	22 59.7	0.87725	1.30837			2.30	0.3608
7	0.0199	1.089	0.010	339 25.6	22 37.7	343 58.6	22 55.9	0.88299	1.30803			2.43	0.3863
8	0.0227	1.100	0.012	339 24.2	22 37.6	343 1.7	22 52.1	0.88828	1.30766			2.57	0.4102
9	0.0254	1.111	0.012	339 18.5	22 37.2	342 4.7	22 48.3	0.89286	1.30728			2.71	0.4327
10	0.0282	+1.122	+0.010	339 11.0	22 36.7	341 7.5	22 44.5	0.89673	1.30688			-2.85	-0.4540
11	0.0309	1.133	+0.006	339 4.0	22 36.3	340 10.3	22 40.7	0.89978	1.30646			2.98	0.4742
12	0.0336	1.144	0.000	338 59.7	22 36.0	339 13.0	22 36.9	0.90206	1.30603			3.11	0.4933
13	0.0364	1.155	-0.006	339 9.9	22 36.1	338 15.5	22 33.0	0.90382	1.30558			3.25	0.5115
14	0.0391	1.166	0.011	339 8.7	22 36.6	337 18.0	22 29.2	0.90532	1.30512			3.38	0.5289
15	0.0419	+1.177	-0.016	339 23.6	22 37.6	336 20.3	22 25.4	0.90689	1.30464			-3.51	-0.5454
16	0.0446	1.187	0.018	339 44.5	22 39.0	335 22.4	22 21.5	0.90907	1.30414			3.64	0.5612
17	0.0473	1.198	0.017	340 9.9	22 40.7	334 24.5	22 17.6	0.91211	1.30362			3.77	0.5763
18	0.0501	1.208	0.013	340 34.4	22 42.3	333 26.4	22 13.8	0.91629	1.30310			3.90	0.5908
h (8.0) 19	0.0528	1.219	-0.007	340 54.4	22 43.6	332 28.2	22 9.9	0.92151	1.30256			4.02	0.6047
20	0.0555	+1.229	+0.001	341 6.1	22 44.4	331 29.9	22 6.0	0.92741	1.30201			-4.15	-0.6180
21	0.0583	1.239	0.008	341 8.3	22 44.6	330 31.4	22 2.1	0.93344	1.30144			4.27	0.6308
22	0.0610	1.249	0.013	341 1.8	22 44.1	329 32.7	21 58.2	0.93897	1.30087			4.40	0.6430
23	0.0638	1.259	0.015	340 49.6	22 43.3	328 33.9	21 54.3	0.94362	1.30028			4.52	0.6548
24	0.0665	1.269	0.013	340 36.1	22 42.4	327 35.0	21 50.3	0.94705	1.29968			4.64	0.6662
25	0.0692	+1.279	+0.009	340 26.0	22 41.7	326 35.9	21 46.4	0.94934	1.29907			-4.75	-0.6771
26	0.0720	1.289	+0.003	340 22.8	22 41.5	325 36.7	21 42.5	0.95079	1.29846			4.87	0.6876
27	0.0747	1.299	-0.003	340 27.9	22 41.9	324 37.3	21 38.5	0.95186	1.29783			4.99	0.6978
28	0.0774	1.308	0.007	340 41.1	22 42.7	323 37.8	21 34.5	0.95303	1.29721			5.10	0.7075
29	0.0802	1.318	0.009	340 59.5	22 44.0	322 38.1	21 30.5	0.95479	1.29657			5.21	0.7170
30	0.0829	+1.327	-0.008	341 20.0	22 45.3	321 38.3	21 26.6	0.95738	1.29592			-5.32	-0.7260
31	0.0856	1.336	-0.004	341 38.0	22 46.5	320 38.2	21 22.6	0.96075	1.29528			5.43	0.7348
Feb. 1	0.0884	1.345	0.000	341 50.7	22 47.4	319 38.0	21 18.5	0.96472	1.29463			5.54	0.7432
2	0.0911	1.354	+0.005	341 57.0	22 47.8	318 37.8	21 14.5	0.96897	1.29396			5.64	0.7514
h (9.0) 3	0.0939	1.363	0.009	341 56.4	22 47.8	317 37.3	21 10.5	0.97313	1.29331			5.74	0.7592
4	0.0966	+1.372	+0.012	341 50.7	22 47.4	316 36.6	21 6.4	0.97702	1.29265			-5.84	-0.7668
5	0.0993	1.381	0.013	341 41.1	22 46.7	315 35.9	21 2.4	0.98036	1.29198			5.94	0.7742
6	0.1021	1.390	0.011	341 29.8	22 46.0	314 34.9	20 58.3	0.98304	1.29132			6.04	0.7812
7	0.1048	1.398	0.008	341 19.0	22 45.3	313 33.8	20 54.3	0.98511	1.29067			6.14	0.7880
8	0.1076	1.407	+0.003	341 10.5	22 44.7	312 32.5	20 50.2	0.98656	1.29000			6.23	0.7946
9	0.1103	+1.415	-0.003	341 5.9	22 44.4	311 31.0	20 46.1	0.98750	1.28934			-6.32	-0.8010
10	0.1130	1.423	0.009	341 6.6	22 44.4	310 29.4	20 42.0	0.98817	1.28869			6.41	0.8071
11	0.1158	1.431	0.014	341 13.3	22 44.9	309 27.6	20 37.8	0.98879	1.28804			6.50	0.8130
12	0.1185	1.439	0.017	341 25.7	22 45.7	308 25.6	20 33.7	0.98975	1.28738			6.59	0.8186
13	0.1212	1.447	0.018	341 42.1	22 46.8	307 23.5	20 29.6	0.99138	1.28674			6.67	0.8241
14	0.1240	+1.455	-0.015	341 59.4	22 48.0	306 21.2	20 25.4	0.99386	1.28611			-6.75	-0.8294
15	0.1267	+1.463	-0.010	342 14.1	22 48.9	305 18.8	20 21.3	0.99722	1.28549			-6.83	-0.8344

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	r	f		f'		G		H		Log g.	Log h.	i	Log i.
		In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
	y	s	s	"	"	h m	h m	"	"			"	
Feb. 15	0.1267	+1.463	-0.010	342 14.1	22 48.9	305 18.8	20 21.3	0.99722	1.28549	-6.83	-0.8344		
16	0.1295	1.471	-0.003	342 23.3	22 49.6	304 16.1	20 17.1	1.00129	1.28487	6.91	0.8393		
17	0.1322	1.478	+0.005	342 24.9	22 49.7	303 13.4	20 12.9	1.00557	1.28425	6.98	0.8440		
h 18	0.1349	1.486	0.010	342 19.2	22 49.3	302 10.5	20 8.7	1.00970	1.28365	7.06	0.8485		
(10.0) 19	0.1377	1.493	0.013	342 7.8	22 48.5	301 7.4	20 4.5	1.01314	1.28307	7.13	0.8528		
20	0.1404	+1.501	+0.013	341 54.7	22 47.6	300 4.2	20 0.3	1.01569	1.28249	-7.20	-0.8570		
21	0.1432	1.508	0.009	341 43.5	22 46.9	299 0.9	19 56.1	1.01726	1.28192	7.26	0.8610		
22	0.1459	1.515	+0.004	341 37.4	22 46.5	297 57.4	19 51.8	1.01800	1.28137	7.32	0.8648		
23	0.1486	1.522	-0.002	341 39.0	22 46.6	296 53.8	19 47.6	1.01831	1.28083	7.39	0.8684		
24	0.1514	1.529	0.006	341 47.8	22 47.2	295 50.1	19 43.3	1.01864	1.28031	7.44	0.8718		
25	0.1541	+1.536	-0.009	342 2.4	22 48.2	294 46.2	19 39.1	1.01932	1.27980	-7.50	-0.8751		
26	0.1568	1.543	0.008	342 20.0	22 49.3	293 42.3	19 34.9	1.02073	1.27931	7.56	0.8783		
27	0.1596	1.550	0.005	342 36.5	22 50.4	292 38.2	19 30.6	1.02282	1.27883	7.61	0.8813		
28	0.1623	1.557	-0.001	342 49.5	22 51.3	291 34.1	19 26.3	1.02552	1.27837	7.66	0.8841		
Mar. 1	0.1650	1.563	+0.004	342 56.9	22 51.8	290 29.8	19 22.0	1.02850	1.27794	7.71	0.8868		
2	0.1678	+1.570	+0.009	342 58.6	22 51.9	289 25.4	19 17.7	1.03152	1.27752	-7.75	-0.8893		
3	0.1705	1.576	0.012	342 55.3	22 51.7	288 21.0	19 13.4	1.03431	1.27711	7.79	0.8917		
4	0.1733	1.583	0.013	342 48.7	22 51.2	287 16.5	19 9.1	1.03668	1.27674	7.83	0.8940		
5	0.1760	1.589	0.012	342 40.2	22 50.7	286 11.9	19 4.8	1.03853	1.27638	7.87	0.8961		
h 6	0.1787	1.596	0.010	342 31.9	22 50.1	285 7.2	19 0.5	1.03981	1.27603	7.91	0.8980		
(11.0) 7	0.1815	+1.602	+0.005	342 25.3	22 49.7	284 2.5	18 56.2	1.04058	1.27572	-7.94	-0.8998		
8	0.1842	1.608	-0.001	342 22.0	22 49.5	282 57.7	18 51.8	1.04089	1.27542	7.97	0.9015		
9	0.1870	1.615	0.007	342 23.4	22 49.6	281 52.9	18 47.5	1.04091	1.27515	8.00	0.9030		
10	0.1897	1.621	0.012	342 30.0	22 50.0	280 48.0	18 43.2	1.04088	1.27489	8.02	0.9044		
11	0.1924	1.627	0.016	342 41.9	22 50.8	279 43.1	18 38.9	1.04105	1.27466	8.05	0.9057		
12	0.1952	+1.633	-0.017	342 57.9	22 51.9	278 38.2	18 34.5	1.04170	1.27445	-8.07	-0.9068		
13	0.1979	1.639	0.016	343 15.7	22 53.0	277 33.2	18 30.2	1.04309	1.27427	8.09	0.9078		
14	0.2006	1.645	0.011	343 32.3	22 54.2	276 28.2	18 25.9	1.04526	1.27411	8.10	0.9086		
15	0.2034	1.652	-0.005	343 44.7	22 55.0	275 23.2	18 21.5	1.04812	1.27398	8.12	0.9093		
16	0.2061	1.658	+0.002	343 51.0	22 55.4	274 18.2	18 17.2	1.05132	1.27387	8.13	0.9099		
17	0.2089	+1.664	+0.008	343 50.5	22 55.4	273 13.2	18 12.9	1.05451	1.27378	-8.14	-0.9104		
18	0.2116	1.670	0.012	343 44.7	22 55.0	272 8.2	18 8.5	1.05726	1.27372	8.14	0.9107		
19	0.2143	1.676	0.012	343 36.1	22 54.4	271 3.2	18 4.2	1.05929	1.27369	8.15	0.9109		
20	0.2171	1.682	0.010	343 28.3	22 53.9	269 58.2	17 59.9	1.06043	1.27368	8.15	0.9110		
h 21	0.2198	1.688	+0.005	343 24.8	22 53.7	268 53.2	17 55.5	1.06084	1.27369	8.14	0.9109		
(12.0) 22	0.2226	+1.694	-0.001	343 27.7	22 53.8	267 48.4	17 51.2	1.06075	1.27373	-8.14	-0.9107		
23	0.2253	1.700	0.006	343 37.8	22 54.5	266 43.6	17 46.9	1.06064	1.27379	8.14	0.9104		
24	0.2280	1.706	0.009	343 54.0	22 55.6	265 38.8	17 42.6	1.06084	1.27387	8.13	0.9099		
25	0.2308	1.712	0.009	344 13.5	22 56.9	264 34.1	17 38.3	1.06159	1.27399	8.12	0.9093		
26	0.2335	1.718	0.007	344 33.3	22 58.2	263 29.5	17 34.0	1.06307	1.27412	8.10	0.9086		
27	0.2362	+1.724	-0.003	344 50.4	22 59.4	262 25.0	17 29.7	1.06514	1.27428	-8.09	-0.9077		
28	0.2390	1.730	+0.003	345 2.9	23 0.2	261 20.5	17 25.4	1.06760	1.27446	8.07	0.9067		
29	0.2417	1.736	0.008	345 10.1	23 0.7	260 16.2	17 21.1	1.07017	1.27467	8.05	0.9056		
30	0.2444	1.742	0.011	345 12.3	23 0.8	259 11.9	17 16.8	1.07253	1.27489	8.02	0.9044		
31	0.2472	1.749	0.013	345 11.0	23 0.7	258 7.8	17 12.5	1.07461	1.27514	8.00	0.9030		
Apr. 1	0.2499	+1.755	+0.013	345 7.7	23 0.5	257 3.8	17 8.3	1.07618	1.27541	-7.97	-0.9015		
2	0.2527	+1.761	+0.011	345 4.3	23 0.3	255 59.9	17 4.0	1.07727	1.27570	-7.94	-0.8997		

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)		$\tau$	$f$		$f'$		$G$				$H$				Log $g$ .	Log $h$ .	$i$	Log $i$ .
			In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.	In Arc.	In Time.								
		y	s	s	°	'	h	m	°	'	h	m					"	
Apr.   <																		

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$f'$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .
		In Time.		In Time.		In Arc.	In Time.	In Arc.	In Time.				
	y	s		s		° ' "	h m	° ' "	h m			"	
May 17	0.3759	+2.111		-0.009		351 35.7	23 26.4	211 5.4	14 4.4	1.14139	1.30048	-4.47	-0.6507
18	0.3786	2.121		0.011		351 54.0	23 27.6	210 9.8	14 0.7	1.14256	1.30104	4.36	0.6394
19	0.3814	2.130		0.010		352 14.0	23 28.9	209 14.4	13 57.0	1.14435	1.30158	4.24	0.6277
20	0.3841	2.140		0.007		352 32.0	23 30.1	208 19.1	13 53.3	1.14671	1.30211	4.13	0.6155
h 21	0.3868	2.150		-0.002		352 46.4	23 31.0	207 24.0	13 49.6	1.14949	1.30264	4.01	0.6029
(16.0) 22	0.3896	+2.160		+0.004		352 56.1	23 31.7	206 29.0	13 45.9	1.15248	1.30314	-3.89	-0.5897
23	0.3923	2.170		0.009		353 1.1	23 32.1	205 34.2	13 42.3	1.15536	1.30363	3.77	0.5760
24	0.3950	2.180		0.012		353 2.3	23 32.2	204 39.5	13 38.6	1.15799	1.30412	3.65	0.5618
25	0.3978	2.190		0.013		353 1.3	23 32.1	203 45.0	13 35.0	1.16026	1.30459	3.52	0.5469
26	0.4005	2.200		0.012		352 59.6	23 32.0	202 50.6	13 31.4	1.16207	1.30504	3.40	0.5314
27	0.4033	+2.210		+0.009		352 58.5	23 31.9	201 56.4	13 27.8	1.16348	1.30549	-3.28	-0.5152
28	0.4060	2.220		+0.004		352 59.2	23 32.0	201 2.2	13 24.1	1.16458	1.30592	3.15	0.4983
29	0.4087	2.231		-0.001		353 2.6	23 32.2	200 8.2	13 20.5	1.16541	1.30633	3.02	0.4805
30	0.4115	2.241		0.007		353 9.5	23 32.6	199 14.3	13 17.0	1.16622	1.30673	2.90	0.4619
31	0.4142	2.252		0.012		353 19.9	23 33.3	198 20.5	13 13.4	1.16714	1.30710	2.77	0.4423
June 1	0.4169	+2.262		-0.015		353 33.3	23 34.2	197 26.9	13 9.8	1.16831	1.30748	-2.64	-0.4217
2	0.4197	2.273		0.016		353 48.8	23 35.3	196 33.4	13 6.2	1.16995	1.30783	2.51	0.3999
3	0.4224	2.283		0.015		354 4.2	23 36.3	195 39.9	13 2.7	1.17215	1.30816	2.38	0.3768
4	0.4252	2.294		0.010		354 17.7	23 37.2	194 46.6	12 59.1	1.17490	1.30848	2.25	0.3524
h 5	0.4279	2.305		-0.003		354 27.3	23 37.7	193 53.3	12 55.5	1.17805	1.30879	2.12	0.3263
(17.0) 6	0.4306	+2.316		+0.004		354 32.0	23 38.1	193 0.1	12 52.0	1.18135	1.30906	-1.99	-0.2984
7	0.4334	2.326		0.010		354 31.5	23 38.0	192 7.0	12 48.5	1.18451	1.30932	1.86	0.2686
8	0.4361	2.337		0.014		354 27.4	23 37.8	191 14.0	12 44.9	1.18726	1.30957	1.72	0.2365
9	0.4388	2.348		0.014		354 21.7	23 37.4	190 21.1	12 41.4	1.18940	1.30980	1.59	0.2016
10	0.4416	2.359		0.011		354 17.2	23 37.1	189 28.2	12 37.9	1.19090	1.31002	1.46	0.1635
11	0.4443	+2.370		+0.006		354 16.2	23 37.1	188 35.3	12 34.4	1.19193	1.31021	-1.32	-0.1217
12	0.4471	2.381		-0.001		354 20.1	23 37.3	187 42.5	12 30.8	1.19270	1.31038	1.19	0.0752
13	0.4498	2.392		0.006		354 29.0	23 37.9	186 49.8	12 27.3	1.19358	1.31055	1.06	0.0231
14	0.4525	2.403		0.010		354 41.7	23 38.8	185 57.1	12 23.8	1.19478	1.31068	0.92	9.9637
15	0.4553	2.414		0.010		354 56.0	23 39.7	185 4.4	12 20.3	1.19652	1.31079	0.78	9.8947
16	0.4580	+2.425		-0.008		355 9.3	23 40.6	184 11.8	12 16.8	1.19879	1.31090	-0.65	-9.8126
17	0.4608	2.436		-0.003		355 19.6	23 41.3	183 19.2	12 13.3	1.20147	1.31098	0.51	9.7110
18	0.4635	2.447		+0.002		355 25.8	23 41.7	182 26.6	12 9.8	1.20435	1.31105	0.38	9.5781
19	0.4662	2.458		0.007		355 27.8	23 41.9	181 34.1	12 6.3	1.20721	1.31109	0.24	9.3854
h 20	0.4690	2.469		0.011		355 25.9	23 41.7	180 41.5	12 2.8	1.20983	1.31111	-0.11	-9.0303
(18.0) 21	0.4717	+2.480		+0.013		355 22.1	23 41.5	179 49.0	11 59.3	1.21214	1.31112	+0.03	+8.4543
22	0.4744	2.491		0.013		355 17.1	23 41.1	178 56.5	11 55.8	1.21402	1.31111	0.16	9.2152
23	0.4772	2.502		0.010		355 12.5	23 40.8	178 3.9	11 52.3	1.21556	1.31107	0.30	9.4767
24	0.4799	2.513		+0.006		355 9.2	23 40.6	177 11.4	11 48.8	1.21675	1.31102	0.44	9.6387
25	0.4827	2.524		0.000		355 8.4	23 40.6	176 18.9	11 45.3	1.21772	1.31096	0.57	9.7563
26	0.4854	+2.535		-0.006		355 10.4	23 40.7	175 26.3	11 41.8	1.21857	1.31086	+0.71	+9.8486
27	0.4881	2.546		0.011		355 15.3	23 41.0	174 33.8	11 38.3	1.21945	1.31075	0.84	9.9246
28	0.4909	2.557		0.015		355 22.9	23 41.5	173 41.2	11 34.7	1.22054	1.31062	0.98	9.9892
29	0.4936	2.568		0.017		355 32.6	23 42.2	172 48.6	11 31.2	1.22200	1.31048	1.11	0.0452
30	0.4963	2.579		0.016		355 42.8	23 42.9	171 55.9	11 27.7	1.22390	1.31032	1.24	0.0948
July 1	0.4991	+2.590		-0.012		355 51.7	23 43.4	171 3.3	11 24.2	1.22629	1.31013	+1.38	+0.1391
2	0.5018	+2.600		-0.006		355 57.8	23 43.9	170 10.6	11 20.7	1.22909	1.30994	+1.51	+0.1793

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	r	f		f'		G		H		Log g.	Log h.	i	Log i.
		In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
July	1	0.4991	+2.590	-0.012	355 51.7	23 43.4	171 3.3	11 24.2	1.22629	1.31013	+1.38	+0.1391	
	2	0.5018	2.600	-0.006	355 57.8	23 43.9	170 10.6	11 20.7	1.22909	1.30994	1.51	0.1793	
	3	0.5046	2.611	+0.001	355 59.6	23 44.0	169 17.8	11 17.2	1.23205	1.30971	1.64	0.2159	
	4	0.5073	2.622	0.007	355 57.0	23 43.8	168 24.9	11 13.7	1.23500	1.30948	1.78	0.2495	
h	5	0.5100	2.633	0.012	355 50.6	23 43.4	167 32.0	11 10.1	1.23763	1.30922	1.91	0.2807	
(19.0)	6	0.5128	+2.644	+0.014	355 42.4	23 42.8	166 39.1	11 6.6	1.23975	1.30896	+2.04	+0.3096	
	7	0.5155	2.654	0.012	355 34.5	23 42.3	165 46.1	11 3.1	1.24131	1.30866	2.17	0.3366	
	8	0.5182	2.665	0.008	355 29.1	23 41.9	164 53.0	10 59.6	1.24238	1.30835	2.30	0.3619	
	9	0.5210	2.676	+0.002	355 27.9	23 41.9	163 59.8	10 56.0	1.24313	1.30804	2.43	0.3857	
	10	0.5237	2.686	-0.004	355 31.2	23 42.1	163 6.5	10 52.4	1.24387	1.30769	2.56	0.4082	
	11	0.5265	+2.697	-0.008	355 38.3	23 42.6	162 13.2	10 48.9	1.24481	1.30733	+2.69	+0.4294	
	12	0.5292	2.707	0.010	355 47.6	23 43.2	161 19.7	10 45.3	1.24616	1.30697	2.82	0.4496	
	13	0.5319	2.717	0.008	355 56.7	23 43.8	160 26.1	10 41.7	1.24797	1.30659	2.94	0.4687	
	14	0.5347	2.728	-0.004	356 3.7	23 44.2	159 32.5	10 38.2	1.25017	1.30619	3.07	0.4869	
	15	0.5374	2.738	+0.001	356 7.3	23 44.5	158 38.7	10 34.6	1.25263	1.30577	3.19	0.5043	
	16	0.5402	+2.748	+0.006	356 7.1	23 44.5	157 44.8	10 31.0	1.25510	1.30533	+3.32	+0.5209	
	17	0.5429	2.758	0.011	356 3.5	23 44.2	156 50.8	10 27.4	1.25740	1.30489	3.44	0.5368	
	18	0.5456	2.769	0.013	355 57.4	23 43.8	155 56.6	10 23.8	1.25943	1.30443	3.56	0.5520	
	19	0.5484	2.779	0.013	355 50.2	23 43.3	155 2.4	10 20.2	1.26108	1.30397	3.68	0.5665	
	20	0.5511	2.789	0.011	355 43.0	23 42.9	154 8.0	10 16.5	1.26239	1.30348	3.81	0.5805	
h	21	0.5538	+2.798	+0.007	355 37.0	23 42.5	153 13.5	10 12.9	1.26339	1.30298	+3.93	+0.5939	
(20.0)	22	0.5566	2.808	+0.002	355 32.9	23 42.2	152 18.8	10 9.3	1.26415	1.30247	4.05	0.6069	
	23	0.5593	2.818	-0.004	355 31.2	23 42.1	151 24.0	10 5.6	1.26476	1.30195	4.16	0.6193	
	24	0.5621	2.828	0.009	355 32.3	23 42.2	150 29.1	10 1.9	1.26536	1.30142	4.28	0.6312	
	25	0.5648	2.837	0.014	355 36.0	23 42.4	149 34.0	9 58.3	1.26607	1.30088	4.39	0.6428	
	26	0.5675	+2.847	-0.017	355 41.7	23 42.8	148 38.8	9 54.6	1.26705	1.30034	+4.51	+0.6539	
	27	0.5703	2.856	0.017	355 48.5	23 43.2	147 43.5	9 50.9	1.26840	1.29977	4.62	0.6646	
	28	0.5730	2.866	0.015	355 54.6	23 43.6	146 48.0	9 47.2	1.27015	1.29920	4.73	0.6749	
	29	0.5757	2.875	0.010	355 58.8	23 43.9	145 52.3	9 43.5	1.27230	1.29862	4.84	0.6849	
	30	0.5785	2.884	-0.003	355 59.6	23 44.0	144 56.5	9 39.8	1.27472	1.29803	4.95	0.6945	
	31	0.5812	+2.893	+0.004	355 56.5	23 43.8	144 0.5	9 36.0	1.27716	1.29745	+5.06	+0.7039	
Aug.	1	0.5840	2.902	0.010	355 49.9	23 43.3	143 4.3	9 32.3	1.27942	1.29685	5.16	0.7129	
	2	0.5867	2.911	0.013	355 40.9	23 42.7	142 8.1	9 28.5	1.28126	1.29624	5.27	0.7216	
	3	0.5894	2.920	0.013	355 31.7	23 42.1	141 11.5	9 24.8	1.28265	1.29563	5.37	0.7300	
	4	0.5922	2.929	0.009	355 24.2	23 41.6	140 14.9	9 21.0	1.28354	1.29502	5.47	0.7381	
h	5	0.5949	+2.938	+0.004	355 20.1	23 41.3	139 18.0	9 17.2	1.28409	1.29440	+5.57	+0.7460	
(21.0)	6	0.5976	2.946	-0.002	355 20.2	23 41.3	138 21.0	9 13.4	1.28450	1.29378	5.67	0.7536	
	7	0.6004	2.955	0.007	355 24.2	23 41.6	137 23.8	9 9.6	1.28503	1.29315	5.77	0.7610	
	8	0.6031	2.963	0.009	355 30.9	23 42.1	136 26.4	9 5.8	1.28588	1.29253	5.86	0.7681	
	9	0.6059	2.972	0.008	355 38.1	23 42.5	135 28.7	9 1.9	1.28713	1.29191	5.96	0.7750	
	10	0.6086	+2.980	-0.005	355 44.2	23 42.9	134 31.0	8 58.1	1.28877	1.29128	+6.05	+0.7817	
	11	0.6113	2.988	0.000	355 47.5	23 43.2	133 33.0	8 54.2	1.29066	1.29065	6.14	0.7881	
	12	0.6141	2.996	+0.005	355 47.5	23 43.2	132 34.8	8 50.3	1.29263	1.29003	6.23	0.7944	
	13	0.6168	3.004	0.010	355 44.1	23 42.9	131 36.4	8 46.4	1.29450	1.28940	6.32	0.8004	
	14	0.6196	3.012	0.013	355 38.2	23 42.5	130 37.9	8 42.5	1.29613	1.28878	6.40	0.8062	
	15	0.6223	+3.020	+0.014	355 31.0	23 42.1	129 39.1	8 38.6	1.29746	1.28815	+6.48	+0.8119	
	16	0.6250	+3.028	+0.013	355 23.6	23 41.6	128 40.2	8 34.7	1.29845	1.28753	+6.57	+0.8173	



## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$f'$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .
		In Time.	In Time.	In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
	$y$	$s$	$s$	$''$	$''$	$''$	$''$	$''$	$''$			$''$	
Aug. 16	0.6250	+3.028	+0.013	355 23.6	23 41.6	128 40.2	8 34.7	1.29845	1.28753			+6.57	+0.8173
17	0.6278	3.036	0.009	355 17.1	23 41.1	127 41.1	8 30.7	1.29914	1.28692			6.65	0.8226
18	0.6305	3.043	+0.005	355 12.2	23 40.8	126 41.8	8 26.8	1.29959	1.28632			6.72	0.8277
19	0.6332	3.051	-0.001	355 9.6	23 40.6	125 42.3	8 22.8	1.29986	1.28572			6.80	0.8326
20	0.6360	3.058	0.007	355 9.4	23 40.6	124 42.6	8 18.8	1.30011	1.28512			6.88	0.8373
h (22.0) 21	0.6387	+3.066	-0.012	355 11.8	23 40.8	123 42.7	8 14.8	1.30039	1.28454			+6.95	+0.8419
22	0.6414	3.073	0.016	355 16.4	23 41.1	122 42.6	8 10.8	1.30087	1.28396			7.02	0.8462
23	0.6442	3.080	0.017	355 22.3	23 41.5	121 42.4	8 6.8	1.30165	1.28339			7.09	0.8505
24	0.6469	3.087	0.016	355 28.3	23 41.9	120 42.0	8 2.8	1.30281	1.28283			7.15	0.8545
25	0.6497	3.094	0.012	355 33.0	23 42.2	119 41.4	7 58.8	1.30433	1.28228			7.22	0.8584
26	0.6524	+3.101	-0.006	355 35.1	23 42.3	118 40.7	7 54.7	1.30613	1.28175			+7.28	+0.8622
27	0.6551	3.108	+0.001	355 33.8	23 42.2	117 39.7	7 50.6	1.30804	1.28122			7.34	0.8658
28	0.6579	3.115	0.007	355 29.2	23 41.9	116 38.6	7 46.6	1.30988	1.28071			7.40	0.8692
29	0.6606	3.122	0.011	355 22.0	23 41.5	115 37.3	7 42.5	1.31142	1.28020			7.46	0.8725
30	0.6634	3.129	0.012	355 13.9	23 40.9	114 35.9	7 38.4	1.31255	1.27972			7.51	0.8757
Sept. 31	0.6661	+3.135	+0.009	355 6.8	23 40.5	113 34.3	7 34.3	1.31322	1.27925			+7.56	+0.8787
1	0.6688	3.142	+0.005	355 2.6	23 40.2	112 32.5	7 30.2	1.31355	1.27879			7.61	0.8816
2	0.6716	3.148	-0.001	355 2.1	23 40.1	111 30.6	7 26.0	1.31368	1.27835			7.66	0.8843
3	0.6743	3.155	0.006	355 5.6	23 40.4	110 28.6	7 21.9	1.31386	1.27793			7.71	0.8869
h (23.0) 4	0.6770	3.161	0.009	355 12.1	23 40.8	109 26.4	7 17.8	1.31429	1.27752			7.75	0.8893
5	0.6798	+3.168	-0.009	355 20.1	23 41.3	108 24.0	7 13.6	1.31507	1.27713			+7.79	+0.8916
6	0.6825	3.174	0.006	355 27.5	23 41.8	107 21.4	7 9.4	1.31624	1.27676			7.83	0.8938
7	0.6853	3.180	-0.001	355 32.9	23 42.2	106 18.8	7 5.3	1.31770	1.27641			7.87	0.8958
8	0.6880	3.186	+0.004	355 35.1	23 42.3	105 16.0	7 1.1	1.31930	1.27608			7.90	0.8978
9	0.6907	3.193	0.010	355 34.4	23 42.3	104 13.1	6 56.9	1.32086	1.27576			7.94	0.8995
10	0.6935	+3.199	+0.013	355 30.9	23 42.1	103 10.0	6 52.7	1.32222	1.27547			+7.97	+0.9012
11	0.6962	3.205	0.015	355 25.9	23 41.9	102 6.8	6 48.5	1.32331	1.27520			7.99	0.9027
12	0.6990	3.211	0.014	355 20.4	23 41.4	101 3.5	6 44.2	1.32409	1.27495			8.02	0.9041
13	0.7017	3.217	0.011	355 15.6	23 41.0	100 0.1	6 40.0	1.32456	1.27472			8.04	0.9053
14	0.7044	3.223	0.007	355 12.2	23 40.8	98 56.6	6 35.8	1.32482	1.27451			8.06	0.9065
15	0.7072	+3.229	+0.001	355 10.9	23 40.7	97 53.1	6 31.5	1.32488	1.27432			+8.08	+0.9075
16	0.7099	3.235	-0.005	355 12.0	23 40.8	96 49.4	6 27.3	1.32489	1.27417			8.10	0.9084
17	0.7126	3.241	0.010	355 15.4	23 41.0	95 45.6	6 23.0	1.32492	1.27403			8.11	0.9091
18	0.7154	3.247	0.014	355 21.1	23 41.4	94 41.8	6 18.8	1.32511	1.27391			8.12	0.9097
h (0.0) 19	0.7181	3.252	0.016	355 28.4	23 41.9	93 37.9	6 14.5	1.32556	1.27381			8.13	0.9102
20	0.7208	+3.258	-0.016	355 36.2	23 42.4	92 34.0	6 10.3	1.32633	1.27375			+8.14	+0.9106
21	0.7236	3.264	0.013	355 43.2	23 42.9	91 30.0	6 6.0	1.32745	1.27371			8.14	0.9108
22	0.7263	3.270	0.007	355 48.2	23 43.2	90 26.0	6 1.7	1.32889	1.27368			8.14	0.9109
23	0.7291	3.276	-0.001	355 50.3	23 43.4	89 22.0	5 57.5	1.33049	1.27369			8.14	0.9109
24	0.7318	3.282	+0.005	355 49.1	23 43.3	88 17.8	5 53.2	1.33207	1.27371			8.14	0.9108
25	0.7345	+3.288	+0.009	355 45.3	23 43.0	87 13.7	5 48.9	1.33346	1.27376			+8.14	+0.9105
26	0.7373	3.294	0.011	355 40.1	23 42.7	86 9.6	5 44.6	1.33449	1.27383			8.13	0.9101
27	0.7400	3.300	0.009	355 35.3	23 42.4	85 5.4	5 40.4	1.33511	1.27394			8.12	0.9096
28	0.7428	3.305	+0.005	355 32.6	23 42.2	84 1.3	5 36.1	1.33536	1.27406			8.11	0.9030
29	0.7455	3.311	0.000	355 33.4	23 42.2	82 57.2	5 31.8	1.33541	1.27421			8.10	0.9082
30	0.7482	+3.317	-0.006	355 38.0	23 42.5	81 53.1	5 27.5	1.33545	1.27437			+8.08	+0.9073
Oct. 1	0.7510	+3.323	-0.009	355 46.0	23 43.1	80 49.0	5 23.3	1.33570	1.27456			+8.06	+0.9062



## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$f'$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .
		In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.						
	$y$	$s$	$s$	$^{\circ}$	$h$ $m$	$^{\circ}$	$h$ $m$						
Oct.	1	0.7510	+3.323	-0.009	355 46.0	23 43.1	80 49.0	5 23.3	1.33570	1.27456	+8.06	+0.9062	
	2	0.7537	3.329	0.010	355 55.8	23 43.7	79 44.9	5 19.0	1.33626	1.27477	8.04	0.9050	
	3	0.7564	3.335	0.008	356 5.8	23 44.4	78 40.9	5 14.7	1.33725	1.27501	8.01	0.9037	
	4	0.7592	3.341	-0.004	356 14.2	23 44.9	77 36.9	5 10.5	1.33855	1.27527	7.99	0.9023	
	h	5	0.7619	3.347	+0.002	356 20.0	23 45.3	76 32.9	5 6.2	1.34005	1.27556	7.96	0.9007
	(1.0)	6	0.7647	+3.353	+0.008	356 22.7	23 45.5	75 28.9	5 1.9	1.34156	1.27585	+7.93	+0.8990
	7	0.7674	3.360	0.013	356 22.5	23 45.5	74 25.0	4 57.7	1.34293	1.27618	7.89	0.8972	
	8	0.7701	3.366	0.015	356 20.6	23 45.4	73 21.2	4 53.4	1.34404	1.27652	7.86	0.8952	
	9	0.7729	3.372	0.015	356 18.0	23 45.2	72 17.5	4 49.2	1.34488	1.27688	7.82	0.8931	
	10	0.7756	3.378	0.013	356 15.6	23 45.0	71 13.8	4 44.9	1.34541	1.27727	7.78	0.8908	
	11	0.7784	+3.385	+0.009	356 14.6	23 45.0	70 10.1	4 40.7	1.34572	1.27768	+7.73	+0.8884	
	12	0.7811	3.391	+0.003	356 15.3	23 45.0	69 6.6	4 36.4	1.34586	1.27810	7.69	0.8858	
	13	0.7838	3.397	-0.002	356 18.3	23 45.2	68 3.1	4 32.2	1.34593	1.27853	7.64	0.8831	
	14	0.7866	3.404	0.008	356 23.5	23 45.6	66 59.8	4 28.0	1.34600	1.27899	7.59	0.8803	
	15	0.7893	3.410	0.012	356 30.9	23 46.1	65 56.5	4 23.8	1.34621	1.27947	7.54	0.8773	
h	16	0.7920	+3.417	-0.015	356 39.9	23 46.7	64 53.4	4 19.6	1.34667	1.27997	+7.48	+0.8741	
	17	0.7948	3.424	0.015	356 49.7	23 47.3	63 50.3	4 15.4	1.34741	1.28047	7.43	0.8708	
	18	0.7975	3.431	0.013	356 59.1	23 47.9	62 47.4	4 11.2	1.34849	1.28099	7.37	0.8673	
	19	0.8003	3.438	0.008	357 6.9	23 48.5	61 44.6	4 7.0	1.34989	1.28153	7.31	0.8637	
	h	20	0.8030	3.444	-0.002	357 12.0	23 48.8	60 41.9	4 2.8	1.35150	1.28208	7.24	0.8599
	(2.0)	21	0.8057	+3.451	+0.004	357 14.0	23 48.9	59 39.3	3 58.6	1.35315	1.28264	+7.18	+0.8559
	22	0.8085	3.458	0.009	357 13.3	23 48.9	58 36.9	3 54.5	1.35464	1.28321	7.11	0.8518	
	23	0.8112	3.466	0.011	357 10.7	23 48.7	57 34.7	3 50.3	1.35583	1.28379	7.04	0.8475	
	24	0.8139	3.473	0.010	357 8.0	23 48.5	56 32.5	3 46.2	1.35665	1.28439	6.97	0.8430	
	25	0.8167	3.480	0.006	357 6.8	23 48.5	55 30.4	3 42.0	1.35713	1.28500	6.89	0.8383	
	26	0.8194	+3.487	+0.001	357 8.5	23 48.6	54 28.6	3 37.9	1.35736	1.28561	+6.81	+0.8334	
	27	0.8222	3.495	-0.005	357 13.9	23 48.9	53 26.9	3 33.8	1.35755	1.28623	6.74	0.8284	
	28	0.8249	3.503	0.009	357 22.5	23 49.5	52 25.4	3 29.7	1.35788	1.28686	6.66	0.8232	
	29	0.8276	3.510	0.011	357 33.4	23 50.2	51 24.0	3 25.6	1.35855	1.28749	6.57	0.8177	
	30	0.8304	3.518	0.010	357 44.8	23 51.0	50 22.7	3 21.5	1.35959	1.28813	6.49	0.8121	
Nov.	31	0.8331	+3.526	-0.006	357 55.0	23 51.7	49 21.5	3 17.4	1.36101	1.28878	+6.40	+0.8062	
	1	0.8358	3.534	0.000	358 2.8	23 52.2	48 20.6	3 13.4	1.36264	1.28942	6.31	0.8001	
	2	0.8386	3.542	+0.006	358 7.7	23 52.5	47 19.8	3 9.3	1.36437	1.29007	6.22	0.7938	
	3	0.8413	3.550	0.011	358 9.6	23 52.6	46 19.1	3 5.3	1.36599	1.29074	6.13	0.7873	
	h	4	0.8441	3.558	0.014	358 9.5	23 52.6	45 18.6	3 1.2	1.36739	1.29139	6.03	0.7805
	(3.0)	5	0.8468	+3.567	+0.015	358 8.4	23 52.6	44 18.2	2 57.2	1.36853	1.29205	+5.94	+0.7735
	6	0.8495	3.575	0.014	358 7.3	23 52.5	43 18.0	2 53.2	1.36936	1.29270	5.84	0.7662	
	7	0.8523	3.584	0.010	358 7.2	23 52.5	42 17.9	2 49.2	1.36996	1.29336	5.74	0.7586	
	8	0.8550	3.592	+0.005	358 8.6	23 52.6	41 18.0	2 45.2	1.37041	1.29402	5.63	0.7508	
	9	0.8577	3.601	-0.001	358 11.9	23 52.8	40 18.2	2 41.2	1.37075	1.29466	5.53	0.7427	
	10	0.8605	+3.610	-0.006	358 17.4	23 53.2	39 18.5	2 37.2	1.37112	1.29531	+5.42	+0.7343	
	11	0.8632	3.619	0.011	358 24.7	23 53.6	38 19.0	2 33.3	1.37160	1.29595	5.32	0.7256	
	12	0.8660	3.628	0.014	358 33.7	23 54.2	37 19.7	2 29.3	1.37228	1.29659	5.21	0.7166	
	13	0.8687	3.637	0.015	358 43.3	23 54.9	36 20.5	2 25.4	1.37323	1.29722	5.10	0.7073	
	14	0.8714	3.646	0.013	358 52.8	23 55.5	35 21.4	2 21.4	1.37449	1.29785	4.98	0.6976	
h	15	0.8742	+3.655	-0.009	359 1.0	23 56.1	34 22.5	2 17.5	1.37605	1.29846	+4.87	+0.6875	
	16	0.8769	+3.665	-0.004	359 6.9	23 56.5	33 23.7	2 13.6	1.37784	1.29908	+4.75	+0.6770	

## FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)	$\tau$	$f$		$f'$		$G$		$H$		Log $g$ .	Log $h$ .	$i$	Log $i$ .
		In Time.	In Time.	In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
	$y$	$s$	$s$	$s$	$s$	$h$	$m$	$h$	$m$				
Nov. 16	0.8769	+3.665	-0.004	359 6.9	23 56.5	33 23.7	2 13.6	1.37784	1.29908	+4.75	+0.6770		
17	0.8797	3.674	+0.003	359 9.8	23 56.7	32 25.1	2 9.7	1.37972	1.29969	4.64	0.6662		
18	0.8824	3.684	0.008	359 10.0	23 56.7	31 26.6	2 5.8	1.38147	1.30028	4.52	0.6549		
h 19	0.8851	3.693	0.011	359 8.0	23 56.5	30 28.2	2 1.9	1.38301	1.30086	4.40	0.6432		
(4.0) 20	0.8879	3.703	0.011	359 5.3	23 56.4	29 30.0	1 58.0	1.38418	1.30143	4.28	0.6310		
21	0.8906	+3.713	+0.008	359 3.5	23 56.2	28 31.9	1 54.1	1.38500	1.30199	+4.15	+0.6184		
22	0.8933	3.723	+0.003	359 4.1	23 56.3	27 33.9	1 50.3	1.38556	1.30254	4.03	0.6052		
23	0.8961	3.733	-0.003	359 7.7	23 56.5	26 36.1	1 46.4	1.38601	1.30308	3.90	0.5914		
24	0.8988	3.743	0.008	359 14.7	23 57.0	25 38.4	1 42.6	1.38656	1.30360	3.78	0.5771		
25	0.9016	3.753	0.011	359 23.8	23 57.6	24 40.9	1 38.7	1.38737	1.30410	3.65	0.5621		
26	0.9043	+3.764	-0.011	359 33.9	23 58.3	23 43.4	1 34.9	1.38854	1.30460	+3.52	+0.5464		
27	0.9070	3.774	0.008	359 43.2	23 58.9	22 46.0	1 31.1	1.39008	1.30509	3.39	0.5300		
28	0.9098	3.785	-0.003	359 50.4	23 59.4	21 48.7	1 27.2	1.39187	1.30555	3.26	0.5129		
29	0.9125	3.795	+0.003	359 54.8	23 59.7	20 51.6	1 23.4	1.39379	1.30600	3.13	0.4948		
30	0.9152	3.806	0.009	359 56.4	23 59.8	19 54.6	1 19.6	1.39565	1.30643	2.99	0.4759		
Dec. 1	0.9180	+3.816	+0.013	359 55.6	23 59.7	18 57.6	1 15.8	1.39733	1.30684	+2.86	+0.4559		
2	0.9207	3.827	0.015	359 53.5	23 59.6	18 0.7	1 12.0	1.39873	1.30724	2.72	0.4348		
3	0.9235	3.838	0.014	359 51.2	23 59.4	17 3.9	1 8.3	1.39987	1.30763	2.59	0.4124		
4	0.9262	3.849	0.011	359 49.5	23 59.3	16 7.2	1 4.5	1.40076	1.30799	2.45	0.3888		
h 5	0.9289	3.860	0.007	359 49.2	23 59.3	15 10.5	1 0.7	1.40148	1.30834	2.31	0.3635		
(5.0) 6	0.9317	+3.871	+0.001	359 50.5	23 59.4	14 14.0	0 56.9	1.40208	1.30866	+2.17	+0.3366		
7	0.9344	3.882	-0.005	359 53.5	23 59.6	13 17.5	0 53.2	1.40267	1.30897	2.03	0.3078		
8	0.9371	3.893	0.010	359 58.5	23 59.9	12 21.0	0 49.4	1.40333	1.30926	1.89	0.2767		
9	0.9399	3.904	0.014	0 4.8	0 0.3	11 24.6	0 45.6	1.40415	1.30953	1.75	0.2431		
10	0.9426	3.915	0.015	0 11.9	0 0.8	10 28.2	0 41.9	1.40522	1.30977	1.61	0.2065		
11	0.9454	+3.926	-0.014	0 19.0	0 1.3	9 31.9	0 38.1	1.40657	1.31000	+1.47	+0.1663		
12	0.9481	3.937	0.011	0 25.2	0 1.7	8 35.7	0 34.4	1.40817	1.31020	1.32	0.1219		
13	0.9508	3.948	-0.006	0 29.3	0 2.0	7 39.4	0 30.6	1.41002	1.31039	1.18	0.0723		
14	0.9536	3.960	+0.001	0 30.9	0 2.1	6 43.2	0 26.9	1.41197	1.31055	1.04	0.0161		
15	0.9563	3.971	0.007	0 29.7	0 2.0	5 47.1	0 23.1	1.41386	1.31070	0.89	9.9514		
16	0.9591	+3.982	+0.011	0 26.3	0 1.8	4 50.9	0 19.4	1.41555	1.31083	+0.75	+9.8751		
17	0.9618	3.994	0 012	0 21.8	0 1.5	3 54.8	0 15.7	1.41693	1.31093	0.61	9.7823		
18	0.9645	4.005	0.011	0 17.7	0 1.2	2 58.7	0 11.9	1.41799	1.31101	0.46	9.6640		
19	0.9673	4.016	+0.006	0 15.3	0 1.0	2 2.6	0 8.2	1.41873	1.31107	0.32	9.5006		
h 20	0.9700	4.028	0.000	0 15.5	0 1.0	1 6.6	0 4.4	1.41931	1.31110	0.17	9.2353		
(5.0) 21	0.9727	+4.039	-0.006	0 18.8	0 1.3	0 10.5	0 0.7	1.41991	1.31112	+0.03	+8.4335		
22	0.9755	4.051	0.010	0 24.5	0 1.6	359 14.4	23 57.0	1.42071	1.31111	-0.12	-9.0708		
23	0.9782	4.062	0.011	0 31.4	0 2.1	358 18.4	23 53.2	1.42180	1.31108	0.26	9.4191		
24	0.9810	4.073	0.009	0 38.0	0 2.5	357 22.3	23 49.5	1.42322	1.31104	0.41	9.6098		
25	0.9837	4.085	-0.005	0 43.0	0 2.9	356 26.2	23 45.7	1.42490	1.31096	0.55	9.7418		
26	0.9864	+4.096	+0.001	0 45.5	0 3.0	355 30.0	23 42.0	1.42673	1.31087	-0.70	-9.8427		
27	0.9892	4.108	0.007	0 45.3	0 3.0	354 33.9	23 38.3	1.42857	1.31076	0.84	9.9245		
28	0.9919	4.119	0.012	0 42.7	0 2.8	353 37.7	23 34.5	1.43025	1.31061	0.98	9.9931		
29	0.9946	4.130	0.014	0 38.6	0 2.6	352 41.4	23 30.8	1.43170	1.31045	1.13	0.0523		
30	0.9974	4.142	0.014	0 34.0	0 2.3	351 45.2	23 27.0	1.43289	1.31027	1.27	0.1042		
31	1.0001	+4.153	+0.012	0 29.7	0 2.0	350 48.8	23 23.3	1.43382	1.31007	-1.41	-0.1505		
32	1.0029	+4.164	+0.008	0 26.6	0 1.8	349 52.4	23 19.5	1.43454	1.30985	-1.56	-0.1822		

## 214 BESSELIAN AND INDEPENDENT STAR-NUMBERS, 1917.

FOR WASHINGTON SIDEREAL TWELVE HOURS.

Mean Solar Date.	Log A <sub>1</sub> .	Log B <sub>1</sub> .	Log C.	Log D.	f	G <sub>1</sub>	H	Log g <sub>1</sub> .	Log h.	Log i.
Jan. 0.72	+9.5166	-0.4382	-0.5332	+1.3038	+1.012	337 23	350 22	0.8534	1.3100	-0.1705
10.69	9.5625	0.4415	0.8208	1.2823	1.125	339 19	340 56	0.8934	1.3068	0.4580
20.67	9.6017	0.4529	0.9828	1.2451	1.231	340 30	331 20	0.9294	1.3019	0.6202
30.64	9.6348	0.4689	1.0900	1.1894	1.328	341 12	321 30	0.9606	1.2958	0.7273
Feb. 9.61	9.6627	0.4856	1.1644	1.1097	1.416	341 39	311 24	0.9874	1.2893	0.8017
19.58	+9.6860	-0.4998	-1.2159	+0.9953	+1.494	342 0	301 2	1.0098	1.2830	-0.8532
Mar. 1.56	9.7059	0.5086	1.2497	0.8209	1.564	342 26	290 26	1.0286	1.2779	0.8870
11.53	9.7232	0.5101	1.2684	+0.5006	1.627	343 1	279 41	1.0446	1.2746	0.9057
21.50	9.7391	0.5031	1.2736	-9.5615	1.688	343 50	268 53	1.0586	1.2737	0.9109
31.48	9.7545	0.4867	1.2658	0.5874	1.749	344 56	258 9	1.0717	1.2751	0.9030
Apr. 10.45	+9.7702	-0.4609	-1.2447	-0.8594	+1.812	346 15	247 37	1.0848	1.2787	-0.8819
20.42	9.7866	0.4257	1.2092	1.0160	1.882	347 44	237 21	1.0986	1.2839	0.8464
30.39	9.8040	0.3822	1.1570	1.1206	1.959	349 18	227 24	1.1136	1.2900	0.7943
May 10.37	9.8226	0.3317	1.0835	1.1941	2.045	350 51	217 47	1.1302	1.2963	0.7208
20.34	9.8421	0.2771	0.9802	1.2460	2.138	352 16	208 28	1.1481	1.3020	0.6175
30.31	+9.8621	-0.2223	-0.8282	-1.2813	+2.239	353 29	199 25	1.1669	1.3067	-0.4655
June 9.28	9.8823	0.1727	0.5722	1.3024	2.346	354 26	190 33	1.1864	1.3097	0.2095
19.26	9.9021	0.1343	-9.8035	1.3109	2.455	355 8	181 47	1.2057	1.3111	-9.4409
29.23	9.9211	0.1123	+0.3936	1.3073	2.565	355 34	173 3	1.2244	1.3105	+0.0309
July 9.20	9.9389	0.1087	0.7416	1.2915	2.672	355 47	164 16	1.2421	1.3081	0.3788
19.17	+9.9554	-0.1213	+0.9246	-1.2626	+2.775	355 49	155 20	1.2586	1.3041	+0.5618
29.15	9.9702	0.1451	1.0442	1.2184	2.872	355 44	146 12	1.2734	1.2988	0.6814
Aug. 8.12	9.9834	0.1734	1.1282	1.1555	2.959	355 35	136 48	1.2867	1.2928	0.7654
18.09	9.9950	0.2000	1.1884	1.0671	3.040	355 26	127 6	1.2984	1.2866	0.8257
28.07	0.0051	0.2202	1.2304	0.9393	3.112	355 19	117 6	1.3086	1.2809	0.8677
Sept. 7.04	+0.0142	-0.2300	+1.2577	-0.7374	+3.177	355 19	106 48	1.3177	1.2766	+0.8949
17.01	0.0224	0.2264	1.2714	-0.3131	3.238	355 26	96 17	1.3258	1.2741	0.9088
26.98	0.0302	0.2065	1.2726	+0.1547	3.297	355 43	85 39	1.3334	1.2739	0.9099
Oct. 6.96	0.0380	0.1671	1.2609	0.6891	3.357	356 9	75 0	1.3410	1.2760	0.8982
16.93	0.0462	0.1044	1.2355	0.9152	3.421	356 44	64 26	1.3489	1.2802	0.8727
26.90	+0.0551	-0.0117	+1.1942	+1.0544	+3.491	357 25	54 4	1.3575	1.2859	+0.8314
Nov. 5.87	0.0648	9.8779	1.1335	1.1498	3.570	358 9	43 56	1.3670	1.2923	0.7708
15.85	0.0755	9.6790	1.0466	1.2171	3.658	358 51	34 2	1.3776	1.2987	0.6839
25.82	0.0870	-9.3388	0.9199	1.2637	3.757	359 29	24 22	1.3890	1.3043	0.5572
Dec. 5.79	0.0991	+6.7782	0.7187	1.2936	3.863	0 0	14 54	1.4011	1.3084	0.3559
15.77	+0.1114	+9.2087	+0.2951	+1.3087	+3.974	0 21	5 32	1.4134	1.3107	+9.9324
25.74	0.1237	9.4072	-0.1308	1.3100	4.088	0 33	356 13	1.4257	1.3109	-9.7680
35.71	+0.1354	+9.4473	-0.6660	+1.2975	+4.200	0 35	346 51	1.4374	1.3090	-0.3034

E = +0.003

The above numbers give the same reductions from mean to apparent place as are employed in computing the apparent places of the fixed stars, given on pages 316 to 513, from the mean places, given on pages 217 to 230. In order to render exact interpolation possible through intervals of ten days, all short period terms have been omitted.

# TERMS OF SHORT PERIOD IN THE NUTATION, 1917. 215

## FOR WASHINGTON MEAN MIDNIGHT.

Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$
	"	"		"	"		"	"		"	"
Jan. 0	-0.08	+0.08	Feb. 15	-0.16	-0.09	Apr. 1	+0.22	+0.01	May 17	-0.14	+0.06
1	0.14	+0.04	16	-0.04	0.10	2	0.18	0.04	18	0.18	+0.02
2	0.15	-0.01	17	+0.08	0.07	3	0.11	0.07	19	0.17	-0.03
3	0.12	0.05	18	0.17	-0.05	4	+0.03	0.09	20	0.11	0.07
4	-0.06	0.08	19	0.22	0.00	5	-0.07	0.09	21	-0.03	0.09
5	+0.02	-0.09	20	+0.21	+0.05	6	-0.16	+0.07	22	+0.06	-0.09
6	0.10	0.09	21	0.15	0.09	7	0.23	+0.04	23	0.14	0.08
7	0.16	0.07	22	+0.07	0.10	8	0.27	0.00	24	0.20	0.05
8	0.19	-0.03	23	-0.03	0.09	9	0.25	-0.04	25	0.22	-0.02
9	0.19	0.00	24	0.11	+0.06	10	0.20	0.07	26	0.20	+0.02
10	+0.16	+0.04	25	-0.14	+0.02	11	-0.10	-0.09	27	+0.15	+0.05
11	0.10	0.07	26	0.13	-0.03	12	+0.01	0.09	28	+0.07	0.08
12	+0.01	0.09	27	0.09	0.07	13	0.11	0.07	29	-0.02	0.09
13	-0.09	0.09	28	-0.01	0.09	14	0.19	-0.03	30	0.12	0.08
14	0.19	0.08	Mar. 1	+0.07	0.09	15	0.21	+0.02	31	0.20	0.06
15	-0.26	+0.05	2	+0.15	-0.08	16	+0.18	+0.06	June 1	-0.25	+0.03
16	0.30	+0.01	3	0.20	0.05	17	+0.10	0.09	2	0.27	-0.01
17	0.28	-0.04	4	0.22	-0.02	18	0.00	0.10	3	0.24	0.05
18	0.22	0.07	5	0.20	+0.02	19	-0.09	0.08	4	0.16	0.08
19	-0.11	0.10	6	0.16	0.05	20	0.15	+0.05	5	-0.05	0.10
20	+0.01	-0.10	7	+0.08	+0.08	21	-0.18	0.00	6	+0.06	-0.09
21	0.13	0.07	8	-0.01	0.09	22	0.14	-0.04	7	0.16	0.06
22	0.21	-0.03	9	0.11	0.08	23	-0.08	0.08	8	0.22	-0.01
23	0.24	+0.02	10	0.20	0.07	24	+0.01	0.09	9	0.23	+0.03
24	0.22	0.06	11	0.26	+0.03	25	0.10	0.09	10	0.18	0.08
25	+0.15	+0.09	12	-0.28	-0.01	26	+0.17	-0.07	11	+0.09	+0.10
26	+0.05	0.10	13	0.26	0.05	27	0.21	-0.04	12	-0.01	0.10
27	-0.05	0.09	14	0.19	0.08	28	0.22	0.00	13	0.10	0.07
28	0.12	+0.05	15	-0.08	0.10	29	0.19	+0.03	14	0.16	+0.03
29	0.14	0.00	16	+0.03	0.09	30	0.13	0.06	15	0.17	-0.01
30	-0.13	-0.04	17	+0.14	-0.06	May 1	+0.05	+0.08	16	-0.13	-0.06
31	-0.07	0.07	18	0.20	-0.01	2	-0.04	0.09	17	-0.06	0.08
Feb. 1	+0.01	0.09	19	0.20	+0.04	3	0.14	0.08	18	+0.03	0.09
2	0.09	0.09	20	0.16	0.08	4	0.21	0.05	19	0.12	0.09
3	0.15	0.07	21	+0.08	0.10	5	0.26	+0.02	20	0.18	0.06
4	+0.20	-0.04	22	-0.02	+0.10	6	-0.26	-0.02	21	+0.21	-0.03
5	0.21	-0.01	23	0.10	0.07	7	0.21	0.06	22	0.21	+0.01
6	0.18	+0.03	24	0.15	+0.03	8	0.13	0.09	23	0.17	0.05
7	0.13	0.06	25	0.16	-0.01	9	-0.01	0.10	24	0.10	0.07
8	+0.05	0.08	26	0.11	0.05	10	+0.10	0.08	25	+0.01	0.09
9	-0.05	+0.09	27	-0.04	-0.08	11	+0.18	-0.04	26	-0.09	+0.08
10	0.15	0.08	28	+0.05	0.09	12	0.22	0.00	27	0.18	0.07
11	0.23	0.06	29	0.13	0.09	13	0.21	+0.05	28	0.25	+0.04
12	0.29	+0.02	30	0.19	0.06	14	0.14	0.09	29	0.28	0.00
13	0.29	-0.02	31	0.22	-0.03	15	+0.04	0.10	30	0.27	-0.04
14	-0.25	-0.06	Apr. 1	+0.22	+0.01	16	-0.06	+0.09	July 1	-0.20	-0.07
15	-0.16	-0.09	2	+0.18	+0.04	17	-0.14	+0.06	2	-0.11	-0.09

# 216 TERMS OF SHORT PERIOD IN THE NUTATION, 1917.

## FOR WASHINGTON MEAN MIDNIGHT.

Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$	Date.	$\delta''\psi$	$\delta''\omega$
	"	"		"	"		"	"		"	"
July 1	-0.20	-0.07	Aug. 16	+0.21	+0.03	Oct. 1	-0.15	+0.05	Nov. 16	-0.06	-0.09
2	-0.11	0.09	17	0.15	0.06	2	0.17	0.00	17	+0.04	0.08
3	+0.01	0.09	18	+0.08	0.08	3	0.13	-0.04	18	0.13	0.06
4	0.12	0.07	19	-0.02	0.09	4	-0.06	0.08	19	0.18	-0.01
5	0.20	-0.03	20	0.12	0.08	5	+0.04	0.09	20	0.19	+0.03
6	+0.23	+0.02	21	-0.20	+0.06	6	+0.13	-0.09	21	+0.14	+0.07
7	0.20	0.06	22	0.26	+0.03	7	0.21	0.07	22	+0.06	0.09
8	0.13	0.09	23	0.28	-0.01	8	0.24	-0.03	23	-0.05	0.09
9	+0.03	0.10	24	0.26	0.05	9	0.24	0.00	24	0.13	0.07
10	-0.06	0.08	25	0.19	0.08	10	0.21	+0.04	25	0.18	+0.03
11	-0.13	+0.05	26	-0.09	-0.09	11	+0.14	+0.07	26	-0.18	-0.02
12	0.16	0.00	27	+0.02	0.08	12	+0.06	0.08	27	0.14	0.06
13	0.13	-0.04	28	0.11	0.06	13	-0.04	0.08	28	-0.05	0.09
14	-0.07	0.08	29	0.18	-0.01	14	0.13	0.07	29	+0.05	0.09
15	+0.01	0.09	30	0.19	+0.03	15	0.20	0.05	30	0.15	0.08
16	+0.10	-0.09	31	+0.15	+0.07	16	-0.25	+0.01	Dec. 1	+0.21	-0.06
17	0.17	0.07	Sept. 1	+0.08	0.10	17	0.25	-0.03	2	0.24	-0.02
18	0.21	-0.04	2	-0.02	0.10	18	0.21	0.06	3	0.23	+0.02
19	0.22	0.00	3	0.10	0.07	19	0.14	0.09	4	0.18	0.05
20	0.19	+0.04	4	0.14	+0.03	20	-0.04	0.09	5	0.11	0.07
21	+0.12	+0.06	5	-0.14	-0.02	21	+0.06	-0.08	6	+0.01	+0.08
22	+0.04	0.08	6	0.10	0.06	22	0.14	-0.04	7	-0.08	0.08
23	-0.06	0.09	7	-0.02	0.09	23	0.18	0.00	8	0.16	0.06
24	0.15	0.07	8	+0.07	0.09	24	0.16	+0.05	9	0.22	+0.03
25	0.23	0.05	9	0.16	0.08	25	0.11	0.08	10	0.25	0.00
26	-0.28	+0.01	10	+0.22	-0.06	26	+0.01	+0.10	11	-0.24	-0.04
27	0.28	-0.03	11	0.24	-0.02	27	-0.08	0.09	12	0.18	0.07
28	0.24	0.06	12	0.23	+0.02	28	0.15	0.06	13	-0.10	0.09
29	0.16	0.09	13	0.18	0.05	29	0.18	+0.02	14	+0.01	0.09
30	-0.05	0.09	14	0.11	0.07	30	0.16	-0.03	15	0.11	0.07
31	+0.07	-0.08	15	+0.02	+0.08	31	-0.10	-0.07	16	+0.18	-0.03
Aug. 1	0.16	-0.04	16	-0.08	0.08	Nov. 1	-0.01	0.09	17	0.20	+0.02
2	0.21	0.00	17	0.16	0.07	2	+0.09	0.09	18	0.17	0.06
3	0.21	+0.05	18	0.23	+0.04	3	0.18	0.08	19	+0.10	0.09
4	0.15	0.08	19	0.26	0.00	4	0.23	0.04	20	0.00	0.10
5	+0.06	+0.10	20	-0.26	-0.04	5	+0.25	-0.01	21	-0.09	+0.08
6	-0.03	0.09	21	0.21	0.07	6	0.22	+0.03	22	0.16	+0.05
7	0.11	0.06	22	0.12	0.09	7	0.17	0.06	23	0.18	0.00
8	0.15	+0.02	23	-0.02	0.09	8	+0.08	0.08	24	0.15	-0.05
9	0.13	-0.03	24	+0.08	0.07	9	-0.01	0.08	25	-0.08	0.08
10	-0.08	-0.07	25	+0.15	-0.03	10	-0.10	+0.08	26	+0.02	-0.09
11	0.00	0.09	26	0.18	+0.02	11	0.18	0.05	27	0.11	0.09
12	+0.09	0.09	27	0.15	0.06	12	0.23	+0.02	28	0.19	0.07
13	0.17	0.08	28	+0.08	0.09	13	0.25	-0.02	29	0.23	-0.03
14	0.22	0.05	29	-0.01	0.10	14	0.22	0.05	30	0.23	+0.01
15	+0.23	-0.01	30	-0.09	+0.08	15	-0.16	-0.08	31	+0.20	+0.04
16	+0.21	+0.03	Oct. 1	-0.15	+0.05	16	-0.06	-0.09	32	+0.13	+0.07

# MEAN PLACES OF TEN-DAY STARS, 1917. 217

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.	
			h	m	s	s	s	" ' "	"	"	
33 Piscium . . . . .	4.7	K0	0	1	5.255	+3.0714	-.0006	- 6 10 18.77	+20.136	+0.091	
$\alpha$ Andromedæ ( <i>Alpheratz</i> ) . . . . .	2.2	A0p	0	4	5.642	3.0964	+.0107	+28 37 55.99	19.880	-0.163	
$\beta$ Cassiopeie . . . . .	2.4	F5	0	4	44.428	3.1861	+.0680	+58 41 31.28	19.861	-0.180	
$\epsilon$ Phœnicis . . . . .	3.9	K0	0	5	12.088	3.0506	+.0096	-46 12 19.72	19.848	-0.193	
22 Andromedæ . . . . .	5.1	F0	0	6	0.119	3.1105	+.0021	+45 36 37.45	20.034	-0.004	
$\gamma$ Pegasi . . . . .	2.9	B2	0	8	57.593	+3.0867	+.0003	+14 43 19.85	+20.020	-0.010	
$\delta$ Andromedæ . . . . .	4.5	A2	0	13	59.251	3.1281	-.0044	+36 19 30.33	19.961	-0.047	
$\zeta$ Ceti . . . . .	3.8	K0	0	15	11.958	3.0569	-.0013	- 9 17 2.18	19.972	-0.030	
$\zeta$ Tucanæ . . . . .	4.3	F8	0	15	45.483	3.1464	+.2739	-65 21 43.94	21.170	+1.172	
44 Piscium . . . . .	6.0	G5	0	21	8.836	3.0744	-.0014	+ 1 28 48.19	19.937	-0.023	
$\beta$ Hydri . . . . .	2.9	G0	0	21	24.623	+3.1971	+.0972	-77 43 18.09	+20.276	+0.318	
$\alpha$ Phœnicis . . . . .	2.4	K0	0	22	11.117	2.9720	+.0188	-42 45 24.20	19.548	-0.403	
12 Ceti . . . . .	6.0	K5	0	25	48.196	3.0622	+.0011	- 4 24 56.65	19.918	0.000	
13 Ceti . . . . .	5.2	G0	0	30	58.516	3.0872	+.0273	- 4 2 58.34	19.846	-0.017	
$\zeta$ Cassiopeie . . . . .	3.7	B2	0	32	20.390	3.3298	+.0036	+53 26 25.07	19.839	-0.007	
$\pi$ Andromedæ . . . . .	4.4	B3	0	32	26.620	+3.1982	+.0019	+33 15 45.46	+19.845	0.000	
$\epsilon$ Andromedæ . . . . .	4.5	G5	0	34	9.953	3.1649	-.0172	+28 51 40.54	19.569	-0.234	
$\delta$ Andromedæ . . . . .	3.5	K0	0	34	53.148	3.2026	+.0110	+30 24 24.57	19.717	-0.097	
$\alpha$ Cassiopeie ( <i>Schedir</i> ) . . . . .	†	var.	K0	0	35	47.272	3.3880	+.0063	+56 4 56.41	19.770	-0.032
$\mu$ Phœnicis . . . . .	4.6	K0	0	37	24.283	2.8389	-.0046	-46 32 27.18	19.747	-0.032	
$\beta$ Ceti . . . . .	2.2	K0	0	39	25.444	+3.0124	+.0160	-18 26 30.85	+19.791	+0.041	
$\alpha$ Cassiopeie . . . . .	4.7	B2	0	40	5.617	3.3322	+.0028	+47 49 49.29	19.733	-0.006	
21 Cassiopeie . . . . .	5.6	A2	0	40	8.510	3.9093	-.0050	+74 32 4.64	19.712	-0.026	
$\zeta$ Andromedæ . . . . .	4.3	K0	0	42	56.147	3.1752	-.0073	+23 48 57.14	19.616	-0.078	
$\eta$ Cassiopeie . . . . .	†	3.6	F8	0	44	4.191	3.6149	+.1432	+57 22 35.55	19.200	-0.476
$\delta$ Piscium . . . . .	4.6	K5	0	44	22.471	+3.1103	+.0055	+ 7 8 0.98	+19.627	-0.044	
$\lambda$ Hydri . . . . .	5.0	K5	0	45	43.258	2.1003	+.0425	-75 22 29.58	19.647	-0.001	
20 Ceti . . . . .	4.9	K0	0	48	45.876	3.0643	-.0005	- 1 35 40.46	19.590	-0.003	
$\gamma$ Cassiopeie . . . . .	2.2	B0p	0	51	41.231	3.5994	+.0036	+60 16 3.24	19.533	-0.005	
$\mu$ Andromedæ . . . . .	3.9	A2	0	52	8.460	3.3217	+.0132	+38 2 57.80	19.559	+0.030	
$\alpha$ Sculptoris . . . . .	4.4	B5	0	54	36.370	+2.8902	-.0018	-29 48 21.70	+19.466	-0.013	
$\epsilon$ Piscium . . . . .	4.4	K0	0	58	38.030	3.1114	-.0054	+ 7 26 36.74	19.419	+0.026	
$\beta$ Phœnicis . . . . .	†	3.4	K0	1	2	22.806	2.6795	-.0057	-47 9 48.05	19.284	-0.024
$\mu$ Cassiopeie . . . . .	5.3	G5	1	2	44.206	3.9711	+.3918	+54 30 49.74	17.744	-1.555	
$\eta$ Ceti . . . . .	3.6	K0	1	4	24.862	3.0175	+.0143	-10 37 18.66	19.134	-0.125	
$\beta$ Andromedæ . . . . .	2.4	Ma	1	5	4.762	+3.3514	+.0148	+35 10 50.85	+19.126	-0.117	
$\tau$ Piscium . . . . .	4.7	K0	1	7	5.091	3.2977	+.0056	+29 38 57.55	19.164	-0.029	
$\zeta$ Piscium . . . . .	†	5.6	A5	1	9	23.597	3.1321	+.0096	+ 7 8 12.37	19.081	-0.052
$\kappa$ Tucanæ . . . . .	†	5.0	F8	1	12	57.309	2.0392	+.0744	-69 19 1.27	19.127	+0.089
$f$ Piscium . . . . .	5.3	A2	1	13	30.988	3.0927	-.0033	+ 3 10 39.65	18.997	-0.024	
$v$ Piscium . . . . .	4.7	A2	1	14	54.019	+3.2913	+.0016	+26 49 41.37	+18.976	-0.008	
$\theta$ Ceti . . . . .	3.8	K0	1	19	52.444	2.9978	-.0057	- 8 36 40.68	18.626	-0.215	
$\delta$ Cassiopeie . . . . .	2.8	A5	1	20	22.443	3.9022	+.0407	+59 48 16.27	18.788	-0.037	
$\gamma$ Phœnicis . . . . .	3.4	K5	1	24	45.714	2.6074	-.0029	-43 44 36.23	18.465	-0.225	
38 Cassiopeie . . . . .	6.0	F5	1	25	1.814	4.4185	+.0263	+69 50 16.94	18.609	-0.072	
$\eta$ Piscium . . . . .	3.7	G5	1	27	2.336	+3.2061	+.0015	+14 55 6.06	+18.614	-0.003	
40 Cassiopeie . . . . .	5.5	K0	1	31	51.309	4.7370	-.0011	+72 37 3.69	18.455	-0.002	
$v$ Andromedæ . . . . .	4.2	G0	1	31	55.147	3.5107	-.0153	+40 59 26.87	18.078	-0.377	
$\pi$ Piscium . . . . .	5.6	F0	1	32	41.751	3.1768	-.0049	+11 43 2.35	18.462	+0.034	
$v$ Persei . . . . .	3.8	K0	1	32	53.356	3.6886	+.0064	+48 12 29.27	18.302	-0.119	
$\alpha$ Eridani ( <i>Achernar</i> ) . . . . .	0.6	B5	1	34	37.452	+2.2361	+.0103	-57 39 29.67	+18.320	-0.041	
$\omega$ Cassiopeie . . . . .	5.5	A0p	1	36	10.410	4.4041	+.0088	+67 37 25.81	18.304	-0.002	
$v$ Piscium . . . . .	4.7	K0	1	37	6.617	3.1199	-.0015	+ 5 4 4.95	18.276	+0.003	
$\phi$ Persei . . . . .	4.2	B0p	1	38	26.963	3.7454	+.0031	+50 16 16.10	18.208	-0.015	
$\tau$ Ceti . . . . .	3.6	K0	1	40	12.695	2.7866	-.1198	-16 22 26.83	19.018	+0.859	
$\alpha$ Piscium . . . . .	4.5	K0	1	41	0.516	+3.1652	+.0049	+ 8 44 25.46	+18.175	+0.045	
$\epsilon$ Sculptoris . . . . .	†	5.4	F0	1	41	45.290	+2.8044	-.0052	-25 28 0.82	+18.051	-0.051

13 Ceti, dup. 5<sup>m</sup>.5, 6<sup>m</sup>.2, 0<sup>m</sup>.3  
 $\alpha$  Cassiop., var. irreg. 2<sup>m</sup>.2, 2<sup>m</sup>.8  
 $\eta$  Cassiop. comp. 7<sup>m</sup>.6, 4<sup>m</sup>.4, pr.

$\beta$  Phœnicis, dup. 4<sup>m</sup>.1, 4<sup>m</sup>.1, 1<sup>m</sup>  
 $\zeta$  Piscium, star 6<sup>m</sup>.5, 24<sup>m</sup>.1 n. l.

$\kappa$  Tucanæ, comp. 7<sup>m</sup>.6, 6<sup>m</sup>.1 n.  
 $\epsilon$  Sculptoris, comp. 6<sup>m</sup>.5, 5<sup>m</sup>.1 n. l.



## 218 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spectr- um.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h	m	s	s	s	" "	" "	" "
ζ Ceti . . . . .	3.9	K0	1	47	21.784	+2.9601	+0.0020	-10 44 40.43	+17.859	-0.027
α Trianguli . . . .	3.6	F5	1	48	20.746	3.4138	+0.0015	+29 10 30.12	17.616	-0.231
ε Cassiopeiae . . .	3.4	B3	1	48	24.487	4.2864	+0.0053	+63 15 43.20	17.830	-0.015
ξ Piscium . . . . .	4.8	K0	1	49	15.422	3.1039	+0.0015	+ 2 46 41.75	17.831	+0.021
β Arietis . . . . .	2.7	A5	1	50	3.057	3.3087	+0.0064	+20 24 10.04	17.668	-0.111
ψ Phoenicis . . . .	4.4	Mb	1	50	19.001	+2.4035	-.0124	-46 42 32.87	+17.663	-0.104
ν Ceti . . . . .	4.2	K5	1	56	5.618	2.8257	+0.0082	-21 28 46.13	17.520	-0.008
α Hydri . . . . .	3.0	F0	1	56	8.844	1.8818	+0.0277	-61 58 24.38	17.552	+0.026
50 Cassiopeiae . . .	4.1	A0	1	56	19.026	5.0648	-.0092	+72 1 13.50	17.539	+0.020
γ Andromedæ pr. . .	2.3	K0	1	58	47.863	3.6720	+0.0046	+41 55 55.46	17.362	-0.051
γ Andromedæ seq. .	5.1	A	Δα +0.842			....	....	Δδ +4.58	....	....
α Arietis . . . . .	2.2	K2	2	29	4.29	+3.3765	+0.0139	+23 4 13.99	+17.106	-0.144
β Trianguli . . . .	3.1	A5	2	4	35.965	3.5621	+0.0126	+34 35 42.98	17.111	-0.044
55 Cassiopeiae . . .	6.2	F5	2	7	56.952	4.6709	-.0020	+66 8 10.27	16.999	-0.002
6 Persei . . . . .	5.4	K0	2	8	4.556	3.9746	+0.0368	+50 40 51.26	16.829	-0.167
ξ <sup>1</sup> Ceti . . . . .	4.5	G5	2	8	35.910	+3.1772	-.0012	+ 8 27 28.09	+16.956	-0.016
μ Fornacis . . . . .	5.2	A0	2	9	14.907	2.6378	-.0037	-31 6 47.04	16.919	-0.022
γ Trianguli . . . .	4.1	A0	2	12	22.490	3.5590	+0.0040	+33 27 50.23	16.742	-0.052
67 Ceti . . . . .	5.7	G5	2	12	50.533	2.9907	+0.0054	- 6 48 15.03	16.661	-0.110
φ Eridani . . . . .	3.8	B8	2	13	32.555	2.1411	+0.0062	-51 53 45.88	16.709	-0.029
ο Ceti (Mira) . . . .	†	var.	Md	2	15 9.150	+3.0292	+0.0002	- 3 21 13.83	+16.431	-0.229
κ Fornacis . . . . .	5.4	F5	2	18	44.646	2.7448	+0.0138	-24 11 35.30	16.406	-0.077
δ Hydri . . . . .	4.3	A2	2	20	16.017	1.0589	-.0097	-69 2 12.48	16.427	+0.020
ι Cassiopeiae . . . .	†	A5p	2	22	12.509	4.9056	-.0003	+67 1 48.50	16.319	+0.010
ξ <sup>2</sup> Ceti . . . . .	4.3	A0	2	23	44.617	3.1867	+0.0025	+ 8 5 19.19	16.223	-0.007
σ Ceti . . . . .	4.8	F5	2	28	9.116	+2.8415	-.0063	-15 36 29.45	+15.899	-0.102
36 H. Cassiopeiae . .	5.3	K0	2	30	6.628	5.6424	-.0052	+72 27 22.70	15.914	+0.017
ν Ceti . . . . .	5.0	G5	2	31	30.967	+3.1453	-.0025	+ 5 13 54.36	15.804	-0.018
μ Hydri . . . . .	5.3	K0	2	33	23.719	-1.3462	+0.0426	-79 28 18.11	15.683	-0.038
ν Arietis . . . . .	5.4	A2	2	34	6.008	+3.4024	+0.0001	+21 36 11.29	15.661	-0.021
δ Ceti . . . . .	4.0	B2	2	35	13.607	+3.0733	+0.0011	- 0 1 43.75	+15.625	+0.004
ε Hydri . . . . .	4.3	B9	2	38	18.462	0.9145	+0.0169	-68 37 20.74	15.456	+0.005
θ Persei . . . . .	4.2	G0	2	38	31.361	4.0843	+0.0353	+48 52 41.76	15.351	-0.087
γ Ceti seq. . . . .	†	A0	2	38	59.876	3.1061	-.0096	+ 2 53 11.96	15.261	-0.151
π Ceti . . . . .	4.4	B5	2	40	10.269	2.8538	-.0012	-14 12 34.51	15.335	-0.012
μ Ceti . . . . .	4.4	A5	2	40	27.153	+3.2396	+0.0188	+ 9 45 52.09	+15.305	-0.025
η Persei . . . . .	†	K0	2	44	37.944	4.3589	+0.0041	+55 33 7.10	15.080	-0.012
41 Arietis . . . . .	3.7	B8	2	45	5.632	3.5233	+0.0050	+26 55 9.16	14.954	-0.111
β Fornacis . . . . .	4.5	K0	2	45	37.016	2.5121	+0.0080	-32 45 14.56	15.190	+0.156
σ Arietis . . . . .	5.5	B5	2	46	54.428	3.3083	+0.0016	+14 44 26.31	14.926	-0.034
τ <sup>2</sup> Eridani . . . . .	4.8	K0	2	47	16.333	+2.7200	-.0044	-21 20 43.61	+14.922	-0.017
τ Persei . . . . .	4.1	G0p	2	48	21.811	4.2376	+0.0008	+52 25 25.44	14.872	-0.003
η Eridani . . . . .	4.0	K0	2	52	22.329	2.9304	+0.0060	- 9 13 40.10	14.424	-0.213
ε Arietis (mean) . . .	†	A2	2	54	27.735	3.4258	-.0009	+21 0 32.67	14.503	-0.010
47 H. Cephei . . . .	5.7	Ma	2	54	59.610	7.8578	-.0102	+79 5 32.52	14.490	+0.010
θ Eridani . . . . .	†	A2	2	55	6.964	+2.2767	-.0025	-40 38 12.34	+14.497	+0.024
α Ceti . . . . .	2.8	Ma	2	57	56.323	3.1334	-.0009	+ 3 45 53.30	14.223	-0.078
τ <sup>3</sup> Eridani . . . . .	4.2	A3	2	58	43.945	2.6449	-.0104	-23 56 56.75	14.209	-0.044
γ Persei . . . . .	3.1	G0p	2	58	46.536	4.3292	+0.0010	+53 10 56.74	14.246	-0.004
ρ Persei . . . . .	†	var.	Mb	2	59 51.117	3.8359	+0.0116	+38 31 9.94	14.068	-0.115
μ Horologii . . . . .	5.2	F0	3	1	39.177	+1.4079	-.0123	-60 3 32.87	+14.018	-0.054
θ Hydri . . . . .	5.5	B8	3	2	4.324	0.1016	+0.0034	-72 13 35.69	14.059	+0.014
β Persei (Algol) . . .	†	var.	B8	3	2 45.724	3.8941	+0.0008	+40 38 12.42	14.000	-0.002
δ Arietis . . . . .	4.5	K0	3	6	52.788	3.4265	+0.0010	+19 24 49.19	13.743	+0.001
12 Eridani . . . . .	†	F8	3	8	32.655	2.5468	+0.0241	-29 18 49.45	14.273	+0.636
48 H. Cephei . . . .	5.5	F0	3	9	44.362	+7.5077	+0.0204	+77 25 53.42	+13.504	-0.055
ζ Arietis . . . . .	5.0	A0	3	10	7.630	+3.4440	-.0019	+20 44 15.26	+13.452	-0.082

ο Ceti, var., 3314, 1<sup>m</sup>.7-9<sup>m</sup>.6, star 0<sup>m</sup> 1.8<sup>s</sup>  
 ζ Cassiop., triple, 7<sup>m</sup>.8<sup>s</sup>, 2<sup>m</sup> 8<sup>s</sup>, 8<sup>s</sup>  
 γ Ceti, comp. 6<sup>m</sup>.2, 2<sup>m</sup> 7<sup>s</sup> pr.

η Persei, star 8<sup>m</sup>.5, 28<sup>m</sup> n. pr.  
 α Arietis, dup., 5<sup>m</sup>.2, 5<sup>m</sup>.6, 1<sup>m</sup>.2  
 θ Eridani, comp. 4<sup>m</sup>.4, 1.8<sup>s</sup>

ρ Persei, var. irreg., 3<sup>m</sup>.4-4<sup>m</sup>.2  
 β Persei, var. 2<sup>m</sup>.87, 2<sup>m</sup>.1-3<sup>m</sup>.2  
 12 Eridani, comp. 7<sup>m</sup>, 1<sup>m</sup> 4 n. pr.

# MEAN PLACES OF TEN-DAY STARS, 1917. 219

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Variation.	Annual P. M.	Declination.	Annual Variation.	Annual P. M.
			h m s	s	s	" ' "	" "	" "
38 G. Horologii . . . . .	† 5.7	N	3 10 26.793	+1.5150	-.0005	-57 37 55.60	+13.508	-0.006
ζ Eridani . . . . .	4.9	A3	3 11 48.028	2.9125	-.0008	- 9 7 38.13	13.479	+0.053
τ Arietis . . . . .	5.2	B3	3 16 25.929	3.4597	+0.0023	+20 50 54.99	13.089	-0.033
ε Eridani . . . . .	4.3	G5	3 16 36.756	+2.3980	+0.2808	-43 23 11.60	13.867	+0.757
ι Hydri . . . . .	5.5	F2	3 18 0.035	-1.5497	+0.0352	-77 41 31.67	13.058	+0.040
α Persei . . . . .	1.9	F5	3 18 23.335	+4.2700	+0.0030	+49 34 0.45	+12.964	-0.028
ο Tauri . . . . .	3.8	G5	3 20 20.663	3.2256	-.0016	+ 8 44 15.33	12.788	-0.074
2 H. Camelopardalis . . . . .	4.4	A0	3 22 20.239	4.8387	+0.0027	+59 39 8.13	12.729	+0.001
ξ Tauri . . . . .	3.8	B8	3 22 40.128	3.2486	+0.0040	+ 9 26 38.30	12.659	-0.046
ζ Tauri . . . . .	4.3	K0	3 26 17.304	3.3093	+0.0016	+12 39 11.11	12.461	+0.002
ε Eridani . . . . .	† 3.8	K0p	3 29 1.141	+2.8253	-.0660	- 9 44 18.21	+12.297	+0.027
τ <sup>2</sup> Eridani . . . . .	4.3	B8	3 30 7.202	2.6484	+0.0023	-21 54 38.44	12.155	-0.039
δ Persei . . . . .	3.1	B5	3 37 0.504	4.2808	+0.0035	+47 31 23.67	11.674	-0.036
δ Eridani . . . . .	3.7	K0	3 39 16.294	2.8731	-.0061	-10 2 37.56	12.280	+0.731
ν Persei . . . . .	3.9	F5	3 39 32.977	4.0675	-.0004	+42 19 2.94	11.530	0.000
5 H. Camelopardalis . . . . .	4.7	A0	3 41 34.461	+6.2872	+0.0059	+71 4 40.54	+11.328	-0.057
η Tauri ( <i>Alcyone</i> ) . . . . .	† 3.0	B5	3 42 32.843	3.5619	+0.0016	+23 50 57.71	11.265	-0.050
τ <sup>2</sup> Eridani . . . . .	4.3	F8	3 43 16.595	2.5807	-.0115	-23 29 36.69	10.780	-0.481
g Eridani . . . . .	4.2	K0	3 46 20.924	+2.2452	-.0036	-36 27 2.88	11.010	-0.028
γ Hydri . . . . .	3.2	Ma	3 48 30.514	-.9631	+0.0096	-74 29 36.94	10.997	+0.117
ζ Persei . . . . .	2.9	B1	3 48 54.636	+3.7660	+0.0010	+31 38 17.23	+10.836	-0.014
9 H. Camelopardalis . . . . .	† 5.2	K0p	3 50 2.934	5.0954	+0.0003	+60 52 1.14	10.750	-0.017
ε Persei . . . . .	† 3.0	B0	3 52 16.786	4.0198	+0.0031	+39 46 16.22	10.575	-0.027
ξ Persei . . . . .	4.0	Oe5	3 53 34.530	3.8873	+0.0012	+35 33 11.66	10.488	-0.017
γ Eridani . . . . .	3.2	K5	3 54 9.390	2.7985	+0.0047	-13 44 37.92	10.352	-0.111
λ Tauri . . . . .	† var.	B3	3 56 4.802	+3.3218	+0.0002	+12 15 24.18	+10.307	-0.011
δ Reticuli . . . . .	4.4	Ma	3 57 25.568	0.9412	-.0020	-61 38 2.57	10.215	-0.002
ν Tauri . . . . .	3.9	A0	3 58 44.381	3.1598	+0.0008	+ 5 45 35.51	10.113	-0.005
Δ Tauri . . . . .	† 4.5	K0	3 59 47.139	3.5436	+0.0069	+21 51 21.96	9.981	-0.058
c Persei . . . . .	4.0	B3p	4 2 37.844	4.3478	+0.0042	+47 29 31.39	9.791	-0.032
p Tauri . . . . .	5.6	F0	4 5 46.378	+3.6495	-.0024	+26 15 55.08	+ 9.540	-0.042
α Eridani . . . . .	4.1	F5	4 7 48.789	2.9274	+0.0007	- 7 3 11.25	9.511	+0.086
μ Tauri . . . . .	4.3	B3	4 11 1.544	3.2558	+0.0016	+ 8 41 7.40	9.152	-0.024
α Horologii . . . . .	3.8	K0	4 11 15.072	1.9874	+0.0040	-42 29 55.70	8.928	-0.230
α Reticuli . . . . .	3.4	G5	4 13 21.071	0.7654	+0.0048	-62 40 53.00	9.039	+0.044
γ Tauri . . . . .	3.9	K0	4 15 4.077	+3.4118	+0.0083	+15 25 41.32	+ 8.834	-0.026
δ Tauri . . . . .	3.9	K0	4 18 8.755	3.4571	+0.0075	+17 20 55.71	8.588	-0.030
ν <sup>5</sup> Eridani . . . . .	4.1	K5	4 20 55.139	+2.2529	+0.0052	-34 12 32.57	8.441	+0.042
δ Menese . . . . .	5.6	K0	4 23 32.981	-1.1420	+0.0042	-80 24 33.81	8.261	+0.072
ε Tauri . . . . .	3.6	K0	4 23 46.086	+3.5009	+0.0082	+18 59 50.43	8.137	-0.034
m Persei . . . . .	† 6.1	F0	4 27 34.256	+4.2156	+0.0012	+42 53 15.99	+ 7.871	+0.004
α Tauri ( <i>Aldebaran</i> ) . . . . .	1.1	K5	4 31 9.358	3.4402	+0.0047	+16 20 36.31	7.388	-0.189
ν Eridani . . . . .	4.1	B2	4 32 10.231	2.9939	-.0005	- 3 31 16.42	7.495	0.000
α Doradus . . . . .	3.5	A0p	4 32 12.109	1.2949	+0.0067	-55 12 58.87	7.482	-0.011
53 Eridani . . . . .	4.0	K0	4 34 22.647	2.7456	-.0061	-14 27 55.42	7.162	-0.154
τ Tauri . . . . .	4.3	B5	4 37 15.692	+3.5988	+0.0007	+22 47 55.34	+ 7.061	-0.020
Groombridge 848 . . . . .	6.0	F0	4 37 38.363	8.0232	+0.0095	+75 47 32.16	6.906	-0.144
α Caeli . . . . .	4.5	F2	4 37 53.125	1.9300	-.0149	-42 1 19.29	6.923	-0.106
4 Camelopardalis . . . . .	5.4	A2	4 41 5.010	4.9874	+0.0062	+56 36 40.34	6.618	-0.148
μ Eridani . . . . .	4.2	B5	4 41 21.091	2.9989	+0.0011	- 3 24 21.10	6.736	-0.009
π <sup>3</sup> Orionis . . . . .	3.3	F8	4 45 19.982	+3.2552	+0.0312	+ 6 49 2.75	+ 6.439	+0.023
9 Camelopardalis . . . . .	4.4	B0	4 45 47.437	5.9495	+0.0038	+66 12 12.27	6.383	+0.005
i Tauri . . . . .	5.1	F0	4 46 31.010	3.5078	+0.0039	+18 41 58.61	6.283	-0.035
π <sup>5</sup> Orionis . . . . .	3.9	B3	4 49 55.628	3.1241	+0.0002	+ 2 18 20.81	6.039	+0.005
z Aurigæ . . . . .	2.9	K2	4 51 35.156	3.9041	+0.0009	+33 2 8.90	5.874	-0.021
ε Aurigæ . . . . .	† var.	F5p	4 56 0.620	+4.3016	+0.0012	+43 42 6.11	+ 5.511	-0.013
β Camelopardalis . . . . .	4.2	G0	4 56 1.676	+5.3265	-.0004	+60 19 21.09	+ 5.512	-0.011

38 Horologii, remarkable purplish red star.  
ε Eridani, comp. 9<sup>m</sup>, 5<sup>s</sup> 7<sup>u</sup>.

γ Tauri, quad., comps. 6<sup>m</sup> 3, 7<sup>m</sup> 6, 8<sup>m</sup> 2, 11<sup>m</sup> 7, 18<sup>m</sup> 1, 19<sup>m</sup> 0.  
9 H. Camelop., comp. 8<sup>m</sup>, 1<sup>m</sup> 9 n. f.  
ε Persei, comp. 8<sup>m</sup>, 8<sup>m</sup> 6 n. f.

λ Tauri, var., 3<sup>d</sup> 95, 3<sup>m</sup> 3-4<sup>m</sup> 2  
Δ Tauri, star 6<sup>m</sup> 5 f. 33<sup>s</sup>, 270<sup>s</sup> a.  
μ Persei, star 6<sup>m</sup>, 115<sup>s</sup> a. pr.  
ε Aurigæ, var. irreg., 3<sup>m</sup> 0-4<sup>m</sup> 5



# 220 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spect- rum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	" ' "	"	"
ζ Aurigæ . . . . .	3.9	K0p	4 56 40.402	+4.1899	+0.013	+40 57 21.44	+5.447	-0.022
ι Tauri . . . . .	4.7	A5	4 58 8.007	3.5849	+0.056	+21 28 20.43	5.296	-0.049
11 Orionis . . . . .	4.6	B9	4 59 49.503	3.4268	+0.013	+15 17 22.30	5.167	-0.036
η Aurigæ . . . . .	3.3	B3	5 0 41.525	4.2044	+0.039	+41 7 24.32	5.058	-0.072
ε Leporis . . . . .	3.3	K5	5 1 56.812	2.5385	+0.012	-22 28 54.23	4.960	-0.064
β Eridani . . . . .	2.9	A2	5 3 46.147	+2.9493	-0.056	- 5 11 34.02	+4.795	-0.074
μ Aurigæ . . . . .	4.8	A3	5 7 44.741	4.1019	-0.020	+38 23 14.50	4.451	-0.080
19 H. Camelopardalis . . . . .	5.2	F8	5 8 51.183	9.8373	-0.075	+79 8 19.22	4.592	+0.155
μ Leporis . . . . .	3.3	A0p	5 9 12.161	2.6940	+0.027	-16 18 10.46	4.379	-0.028
β Orionis (Rigel) . . . . .	† 0.3	B8p	5 10 32.891	2.8823	.0000	- 8 17 47.84	4.292	0.000
α Aurigæ (Capella) . . . . .	0.2	G0	5 10 33.306	+4.4290	+0.086	+45 54 53.67	+3.862	-0.429
λ Aurigæ . . . . .	4.8	G0	5 13 18.021	4.2179	+0.041	+40 1 35.62	3.397	-0.659
τ Orionis . . . . .	3.7	B5	5 13 34.551	2.9126	-0.009	- 6 55 59.47	4.028	-0.005
ο Columbae . . . . .	4.9	K0	5 14 29.293	2.1588	+0.027	-34 58 33.35	3.603	-0.352
γ Orionis (Bellatrix) . . . . .	1.7	B2	5 20 40.711	3.2170	-0.004	+ 6 16 31.57	3.405	-0.017
β Tauri . . . . .	1.8	B8	5 21 2.635	+3.7914	+0.025	+28 32 18.52	+3.214	-0.177
17 Camelopardalis . . . . .	5.8	K5	5 22 19.643	5.6603	+0.003	+62 59 58.21	3.273	-0.007
β Leporis . . . . .	3.0	G0	5 24 41.340	2.5703	.0000	-20 49 29.19	2.987	-0.089
χ Aurigæ . . . . .	4.9	B1	5 27 19.471	3.9041	+0.006	+32 7 54.32	2.835	-0.013
δ Orionis . . . . .	† 2.5	B0	5 27 45.937	3.0643	.0000	- 0 21 34.69	2.808	-0.002
Groombridge 966 . . . . .	6.4	K5	5 28 37.064	+8.0101	-0.002	+74 59 28.43	+2.753	+0.017
α Leporis . . . . .	2.7	F0	5 29 4.156	2.6457	+0.003	-17 52 51.25	2.697	0.000
φ <sup>1</sup> Orionis . . . . .	4.5	B0	5 30 15.778	3.2927	-0.002	+ 9 26 3.34	2.578	-0.015
ι Orionis . . . . .	† 2.9	Oe5	5 31 22.359	2.9343	+0.001	- 5 57 48.67	2.495	-0.002
ε Orionis . . . . .	1.8	B0	5 32 0.075	3.0436	.0000	- 1 15 14.21	2.444	+0.001
ζ Tauri . . . . .	3.0	B3	5 32 41.020	+3.5850	+0.006	+21 5 34.40	+2.352	-0.032
ζ Orionis . . . . .	† 2.0	B0	5 36 34.227	3.0270	+0.005	- 1 59 8.47	2.032	-0.014
α Columbae . . . . .	2.8	B5p	5 36 38.609	2.1725	+0.006	-34 7 4.00	2.001	-0.038
ο Aurigæ . . . . .	5.5	A0	5 39 28.107	4.6454	-0.018	+49 47 28.40	1.775	-0.018
ζ Leporis . . . . .	3.7	A2	5 43 11.644	2.7179	-0.013	-14 51 7.32	1.468	-0.001
κ Orionis . . . . .	2.2	B0	5 43 49.186	+2.8449	+0.001	- 9 41 53.66	+1.411	-0.003
δ Doradus . . . . .	4.5	A5	5 44 37.312	0.1023	-0.081	-65 46 0.00	1.343	-0.001
ν Aurigæ . . . . .	4.2	K0	5 45 44.198	4.1574	-0.001	+39 7 31.68	1.260	+0.013
δ Leporis . . . . .	3.9	K0	5 47 45.084	2.5796	+0.162	-20 53 7.11	0.422	-0.649
α Orionis (Betelgeux) . . . . .	† var.	Ma	5 50 40.683	3.2479	+0.020	+ 7 23 33.32	0.824	+0.009
η Leporis . . . . .	3.8	F5	5 52 37.461	+2.7323	-0.028	-14 10 55.27	+0.786	+0.141
δ Aurigæ . . . . .	3.9	K0	5 52 41.636	4.9419	+0.018	+54 16 47.67	0.520	-0.118
β Aurigæ . . . . .	2.1	A0p	5 53 26.464	4.4019	-0.038	+44 56 25.22	0.568	-0.006
θ Aurigæ . . . . .	† 2.7	A0p	5 54 3.685	4.0917	+0.047	+37 12 28.56	+0.429	-0.091
1 Geminorum . . . . .	4.3	G5	5 59 4.505	3.6475	+0.002	+23 16 7.83	-0.028	-0.109
1 G. Puppis . . . . .	† 6.2	F8	6 2 5.082	+1.7258	-0.088	-45 2 9.80	+0.043	+0.225
ν Orionis . . . . .	4.4	B2	6 2 50.011	3.4264	+0.012	+14 46 45.79	-0.273	-0.025
22 H. Camelopardalis . . . . .	4.7	A0	6 9 42.225	6.6182	+0.026	+69 21 3.47	0.962	-0.114
η Geminorum . . . . .	† var.	Ma	6 9 52.098	3.6227	-0.039	+22 31 54.92	0.879	-0.016
2 Lyncis . . . . .	4.4	A0	6 12 18.204	5.2984	+0.012	+59 2 33.52	1.046	+0.030
ζ Canis Majoris . . . . .	3.1	B3	6 17 7.529	+2.3019	-0.006	-30 1 34.03	-1.520	-0.023
μ Geminorum . . . . .	3.2	Ma	6 17 56.386	3.6307	+0.046	+22 33 26.30	1.682	-0.114
φ <sup>1</sup> Aurigæ . . . . .	5.1	K2	6 18 30.538	4.6259	+0.029	+49 19 54.02	1.621	-0.004
β Canis Majoris . . . . .	2.0	B1	6 19 2.655	2.6416	-0.006	-17 54 49.68	1.660	+0.004
8 Monocerotis . . . . .	† 4.5	A5	6 19 22.225	3.1802	-0.004	+ 4 38 9.54	1.683	+0.009
α Argus (Canopus) . . . . .	-0.9	F0	6 22 6.565	+1.3319	+0.022	-52 39 0.04	-1.922	+0.009
10 Monocerotis . . . . .	5.0	B3	6 23 51.718	2.9641	+0.010	- 4 42 35.53	2.077	+0.006
ν Geminorum . . . . .	4.1	B5	6 24 2.105	3.5629	-0.005	+20 15 56.75	2.114	-0.016
8 Lyncis . . . . .	6.0	G0	6 30 6.605	5.4917	-0.027	+61 33 20.84	2.902	-0.276
ξ <sup>2</sup> Canis Majoris . . . . .	4.5	A0	6 31 34.686	2.5158	+0.022	-22 53 51.86	2.718	+0.035
23 H. Camelopardalis . . . . .	5.6	F8	6 32 5.571	+10.2957	-0.078	+79 39 25.93	-3.431	-0.633
51 Aurigæ . . . . .	5.7	K0	6 32 54.535	+4.1596	-0.020	+39 27 54.79	-2.981	-0.113

β Orionis, comp. 8<sup>m</sup>.0, 9<sup>s</sup>.5 s. pr.  
 ζ Orionis, star 6<sup>m</sup>.9, 52<sup>s</sup>.6 n.  
 α Orionis, comp. 7<sup>m</sup>.3, 11<sup>s</sup>.5 s. f.

ζ Orionis, comp. 4<sup>m</sup>.2, 2<sup>s</sup>.4 s. f.  
 α Orionis red star, var. irreg. 1<sup>m</sup>.0-1<sup>m</sup>.4  
 θ Aurigæ, comp. 7<sup>m</sup>.5, 2<sup>s</sup>.5 n. pr.

1 Puppis, star, 5<sup>m</sup>.8, 150<sup>s</sup>.1 s. f.  
 γ Gem., var. 23<sup>d</sup>.4, 3<sup>m</sup>.2-2<sup>m</sup>.2 comp.  
 8<sup>m</sup>.8, 1<sup>s</sup>.2 n. pr.  
 8 Monoc., star, 6<sup>m</sup>.5, 13<sup>s</sup>.7 n. f.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	" ' "	" "	" "
$\gamma$ Geminorum	1.9	A0	6 32 55.063	+3.4670	+0.003	+16 28 16.07	-2.917	-0.048
$\gamma$ Argus	3.2	B8	6 35 13.382	1.8367	+0.008	-43 7 21.57	3.088	-0.019
$\delta$ Monocerotis	4.7	Oe5	6 36 24.445	3.3047	.0000	+9 58 24.51	3.179	-0.008
$\epsilon$ Geminorum	3.2	G5	6 38 49.590	3.6928	-.0001	+25 12 51.95	3.398	-0.018
$\xi$ Geminorum	3.4	F5	6 40 37.896	3.3684	-.0076	+12 59 10.03	3.728	-0.193
$\psi^3$ Aurigæ	5.3	G0	6 40 45.621	+4.3296	+0.018	+43 39 40.70	-3.386	+0.160
$\alpha$ Canis Majoris ( <i>Sirius</i> )	-1.6	A0	6 41 29.433	2.6434	-.0373	-16 36 5.39	4.816	-1.206
18 Monocerotis	4.7	K0	6 43 31.963	3.1281	-.0020	+2 30 14.20	3.801	-0.016
43 Camelopardalis	5.1	B5	6 44 45.850	6.4874	+0.021	+68 59 12.22	3.878	+0.012
$\theta$ Geminorum	3.6	A2	6 47 19.245	3.9580	+0.010	+34 3 45.02	4.160	-0.050
$\alpha$ Pictoris	3.3	A5	6 47 20.476	+0.6175	-.0104	-61 51 7.91	-3.873	+0.238
$\tau$ Argus	2.8	K0	6 47 52.585	1.4883	+0.025	-50 30 56.32	4.264	-0.107
15 Lyncis	4.5	K0	6 50 5.803	5.2064	+0.021	+58 31 59.14	4.477	-0.130
$\theta$ Canis Majoris	4.2	K2	6 50 20.048	2.7879	-.0091	-11 56 1.24	4.374	-0.007
$\epsilon$ Canis Majoris	1.6	B1	6 55 21.817	2.3575	-.0001	-28 51 30.10	4.793	+0.003
$\zeta$ Geminorum	var.	G0	6 59 11.248	+3.5605	-.0002	+20 41 35.05	-5.127	-0.007
$\gamma^2$ Canis Majoris	3.1	B5p	6 59 33.520	2.5049	-.0006	-23 42 40.29	5.146	+0.005
$\sigma$ Canis Majoris	4.1	B5	7 0 0.220	2.7148	+0.003	-15 30 35.28	5.198	-0.010
$\delta$ Canis Majoris	2.0	F8	7 5 0.931	2.4382	-.0015	-26 15 38.37	5.607	+0.003
63 Aurigæ	5.1	K2	7 5 56.990	4.1326	+0.032	+39 27 25.69	5.692	-0.003
51 Geminorum	5.3	Mb	7 8 36.417	+3.4479	+0.019	+16 18 2.98	-5.953	-0.042
$\gamma^2$ Volantis	3.9	K0	7 9 27.280	-0.5019	+0.004	-70 21 51.69	5.905	+0.078
$\lambda$ Geminorum	3.6	A2	7 13 19.471	+3.4501	-.0029	+16 41 27.81	6.349	-0.045
$\pi$ Argus	2.7	K5	7 14 12.680	2.1189	-.0008	-36 56 52.95	6.388	-0.010
$\delta$ Geminorum	3.5	F0	7 15 10.085	+3.5803	-.0010	-22 8 10.35	6.472	-0.015
$\delta$ Volantis	4.0	F5	7 16 52.958	-0.0199	+0.004	-67 48 19.34	-6.605	-0.006
$\iota$ Geminorum	3.9	K0	7 20 34.438	+3.7302	-.0086	-27 57 50.80	6.991	-0.087
$\eta$ Canis Majoris	2.4	B5p	7 20 48.770	2.3738	+0.003	-29 8 25.61	6.916	+0.007
Groombridge 1308	5.8	K0	7 22 15.511	6.2732	+0.018	+68 38 12.89	7.086	-0.045
$\beta$ Canis Minoris	3.1	B8	7 22 39.049	3.2554	-.0032	+8 27 26.92	7.120	-0.047
$\rho$ Geminorum	4.2	F0	7 23 46.515	+3.8628	+0.018	+31 57 2.93	-6.982	+0.183
$\phi$ Argus	3.3	K5	7 26 35.800	1.9018	-.0072	-43 7 58.09	7.215	+0.180
$\alpha^2$ Geminorum ( <i>Castor</i> )	2.0	A0	7 29 18.402	3.8329	-.0144	+32 4 19.07	7.697	-0.082
$\alpha^1$ Geminorum	2.8	A0	$\Delta\alpha - 0.255$	...	...	$\Delta\delta - 4.13$	...	...
25 Monocerotis	5.2	F5	7 33 9.064	2.9819	-.0066	-3 55 28.96	7.903	+0.022
$\alpha$ Can. Min. ( <i>Procyon</i> )	0.5	F5	7 34 57.476	+3.1420	-.0471	+5 26 18.37	-9.107	-1.087
24 Lyncis	5.0	A2	7 35 59.578	5.0927	-.0042	+58 54 21.49	8.209	-0.056
$\kappa$ Geminorum	3.7	G5	7 39 26.375	3.6263	-.0014	+24 35 52.70	8.487	-0.060
$\beta$ Geminorum ( <i>Pollux</i> )	1.2	K0	7 40 14.369	3.6755	-.0470	+28 13 39.63	8.545	-0.055
4 Puppis	5.1	F2	7 42 7.563	2.7636	-.0003	-14 21 40.59	8.642	-0.002
$\xi$ Argus	3.5	G0	7 45 48.212	+2.5232	-.0004	-24 39 2.57	-8.929	0.000
$\phi$ Geminorum	5.0	A2	7 48 25.235	3.6703	-.0020	+26 58 54.15	9.160	-0.027
26 Lyncis	5.7	K0	7 48 40.533	4.3807	-.0022	+47 46 51.38	9.158	-0.006
Groombridge 1374	5.6	K0	7 50 17.290	7.2404	-.0023	+74 8 29.49	9.315	-0.037
$\chi$ Argus	3.6	B3	7 54 40.144	1.5258	-.0043	-52 45 33.92	9.611	+0.006
$\omega$ Cancri	5.9	K0	7 55 54.675	+3.6336	+0.003	+25 37 15.44	-9.715	-0.004
$\chi$ Geminorum	5.0	K0	7 58 25.439	3.6900	-.0012	+28 1 40.62	9.956	-0.053
27 Lyncis	4.9	A2	8 2 13.397	4.5291	-.0032	+51 44 49.80	10.193	-0.003
$\rho$ Argus	2.9	F5	8 4 0.537	2.5546	-.0065	-24 3 51.19	10.273	+0.052
3 H. Ursæ Majoris	5.5	G5	8 4 34.242	6.0095	+0.002	+68 43 11.87	10.362	+0.005
$\gamma$ Argus	2.2	Oap	8 6 58.547	+1.8498	-.0003	-47 5 29.77	-10.557	-0.011
$\zeta$ Cancri ( <i>mean</i> )	4.7	G0	8 7 27.241	3.4443	+0.051	+17 53 56.75	10.710	-0.129
Bradley 1147	5.7	G5	8 9 9.080	7.6155	+0.077	+76 0 43.16	10.715	-0.008
20 Puppis	5.0	G5	8 9 31.072	2.7580	-.0009	-15 32 14.58	10.733	+0.001
$\beta$ Cancri	3.8	K2	8 12 0.915	3.2555	-.0035	+9 26 31.93	10.971	-0.052
31 Lyncis	4.4	K5	8 17 9.656	+4.1202	+0.015	+43 27 19.70	-11.393	-0.100
$\delta^1$ Cancri	5.9	F0	8 18 36.816	+3.4388	-.0038	+18 35 58.31	-11.420	-0.031

$\delta$  Monoc., comp. 8<sup>m</sup>.8, 2<sup>m</sup>.9 s. pr.  $\gamma^2$  Volantis, comp. 5<sup>m</sup>.8, 12<sup>m</sup>.9 n. pr.  $\gamma$  Argus, star 5<sup>m</sup>, 42<sup>m</sup>.5 s. pr.  
 15 Lyncis, dup., 4<sup>m</sup>.9, 6<sup>m</sup>.2, 0<sup>m</sup>.7.  $\delta$  Gem., comp. 8<sup>m</sup>, 7<sup>m</sup>.0 s. pr.  $\zeta$  Cancri, triple; binary 5<sup>m</sup>.8, 6<sup>m</sup>.3, 1<sup>m</sup>.  
 $\epsilon$  Can. Maj., comp. 9<sup>m</sup>, 7<sup>m</sup>.8 s. f.  $\sigma$  Argus, star 8<sup>m</sup>, 22<sup>m</sup>.4 n. f. with comp. 6<sup>m</sup>.0, 5<sup>m</sup>.4 s. f.  
 $\zeta$  Gem., var., 10<sup>m</sup>.15, 3<sup>m</sup>.7-4<sup>m</sup>.3  $\kappa$  Gem., comp. 8<sup>m</sup>.5, 6<sup>m</sup>.6 s. pr.

Positions given for Sirius and Procyon are those of the centers of their orbits. Corrections given on page xii are to be applied to reduce to the positions of the stars.

## 222 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	° ' "	" "	" "
$\epsilon$ Argus . . . . .	1.7	K0p	8 20 48.714	+1.2336	-.0042	-59 14 31.56	-11.548	+0.008
30 Monocerotis . . . .	4.0	A0	8 21 30.868	+2.9995	-.0039	-3 38 5.42	11.625	-0.020
$\theta$ Chamaeleontis . . .	4.3	K0	8 23 9.121	-1.7505	-.0451	-77 13 2.21	11.705	+0.017
$\sigma$ Ursae Majoris . . .	3.5	G0	8 23 22.930	+5.0107	-.0160	+60 59 48.78	11.851	-0.112
Groombridge 1450 . . .	6.0	K0	8 27 31.536	3.9087	-.0082	+38 18 7.19	12.200	-0.179
$\eta$ Cancri . . . . .	5.5	B5p	8 27 54.709	+3.4741	-.0025	+20 43 26.13	-12.112	-0.055
Groombridge 1446 . . .	6.3	K0	8 30 30.691	6.7404	-.0043	+73 55 16.50	12.356	-0.117
$\delta$ Hydrae . . . . .	4.2	A0	8 33 15.820	3.1780	-.0048	+5 59 38.31	12.442	-0.014
$\sigma$ Hydrae . . . . .	4.5	K0	8 34 25.244	3.1352	-.0008	+3 38 1.20	12.520	-0.013
$\gamma$ Cancri . . . . .	4.7	A0	8 38 29.155	3.4766	-.0071	+21 46 4.17	12.826	-0.043
$\delta$ Cancri . . . . .	4.2	K0	8 39 58.256	+3.4136	-.0009	+18 27 36.47	-13.123	-0.240
$\alpha$ Pyxidis . . . . .	3.7	B2	8 40 15.384	2.4111	-.0003	-32 53 11.68	12.891	+0.011
$\tau$ Cancri . . . . .	4.2	G5	8 41 40.736	3.6375	-.0006	+29 3 51.60	13.048	-0.051
$\epsilon$ Hydrae . . . . .	3.5	F8	8 42 22.940	3.1796	-.0127	+6 43 26.95	13.062	-0.048
$\delta$ Argus . . . . .	2.0	A0	8 42 24.502	1.6517	-.0035	-54 24 14.47	13.145	-0.100
$\sigma^2$ Cancri (mean) . . .	5.5	K0	8 49 11.090	+3.6675	+0.0034	+30 53 40.50	-13.511	-0.021
$\zeta$ Hydrae . . . . .	3.3	K0	8 51 0.503	3.1743	-.0060	+6 15 43.81	13.600	+0.007
$\tau$ Ursae Majoris . . .	3.1	A5	8 53 31.958	4.1218	-.0435	+48 22 6.23	14.017	-0.248
$\alpha$ Cancri . . . . .	4.3	A3	8 53 56.993	3.2844	+0.0024	+12 10 46.93	13.837	-0.042
$b^1$ Carinae . . . . .	5.1	B3	8 54 56.499	1.4680	-.0034	-58 54 31.66	13.877	-0.019
$\kappa$ Ursae Majoris . . .	3.7	A0	8 57 57.998	+4.1098	-.0027	+47 29 8.31	-14.115	-0.067
$\sigma^2$ Ursae Majoris . . .	4.9	F8	9 3 6.642	5.3194	-.0003	+67 28 21.53	14.432	-0.066
$\kappa$ Cancri . . . . .	5.1	B8	9 3 15.224	3.2525	-.0012	+11 0 10.48	14.387	-0.013
$\lambda$ Argus . . . . .	2.2	K5	9 4 56.550	2.2063	-.0015	-43 5 49.80	14.483	-0.007
$\theta$ Hydrae . . . . .	3.8	A0	9 10 2.860	3.1235	+0.0088	+2 39 54.55	15.094	-0.312
$\beta$ Argus . . . . .	1.8	A0	9 12 17.664	+0.6692	-.0310	-69 22 30.83	-14.820	+0.094
83 Cancri . . . . .	6.6	F5	9 14 21.132	3.3533	-.0076	+18 3 28.33	15.170	-0.136
$\tau$ Argus . . . . .	2.2	F0	9 14 51.990	1.6040	-.0055	-58 55 35.56	15.057	+0.006
40 Lyncis . . . . .	3.3	K5	9 16 0.205	3.6630	-.0178	+34 44 39.40	15.116	+0.012
$\theta$ Pyxidis . . . . .	4.9	Ma	9 17 48.883	2.6514	-.0048	-25 36 43.41	15.264	-0.032
$\alpha$ Hydrae . . . . .	2.2	K2	9 23 30.551	+2.9486	-.0010	-8 17 53.44	-15.518	+0.033
$h$ Ursae Majoris . . .	3.8	F0	9 25 0.187	4.7632	+0.0183	+63 25 32.34	15.609	+0.024
$d$ Ursae Majoris . . .	4.6	G0	9 27 10.177	5.3569	-.0112	+70 11 46.05	15.680	+0.071
$\delta$ Ursae Majoris . . .	3.3	F8	9 27 18.915	4.0293	-.1026	+52 3 23.10	16.302	-0.543
$\psi$ Argus . . . . .	3.6	F5	9 27 25.682	2.3595	-.0181	-40 6 11.48	15.727	+0.038
$\xi$ Leonis . . . . .	5.1	G5	9 27 28.447	+3.2367	-.0063	+11 40 4.89	-15.851	-0.084
10 Leonis Minoris . . .	4.6	G5	9 29 8.652	3.6845	+0.0011	+36 46 0.55	15.878	-0.021
$\sigma$ Leonis . . . . .	3.8	F5p	9 36 43.370	3.2048	-.0096	+10 16 14.25	16.287	-0.033
$\theta$ Antliae . . . . .	5.0	F5	9 40 30.080	2.6732	-.0036	-27 23 20.26	16.416	+0.029
$\epsilon$ Leonis . . . . .	3.1	G0p	9 41 8.593	3.4106	-.0034	+24 9 25.02	16.499	-0.022
$v$ Argus . . . . .	3.2	F0	9 45 1.689	+1.5007	-.0025	-64 41 12.71	-16.684	-0.017
$v$ Ursae Majoris . . .	3.9	F0	9 45 6.034	4.2905	-.0382	+59 25 47.52	16.830	-0.157
6 Sextantis . . . . .	6.0	A3	9 47 3.136	3.0244	+0.0011	-3 51 13.59	16.795	-0.028
$\mu$ Leonis . . . . .	4.1	K0	9 48 2.755	3.4167	-.0171	+26 23 54.51	16.868	-0.054
Groombridge 1586 . . .	6.0	K0	9 50 59.596	5.4262	-.0197	+73 16 29.75	17.012	-0.060
19 Leonis Minoris . . .	5.2	F5	9 52 36.398	+3.6843	-.0111	+41 27 5.64	-17.050	-0.022
$\phi$ Argus . . . . .	3.7	B5	9 53 56.760	2.1018	-.0033	-54 10 21.11	17.109	-0.020
$\pi$ Leonis . . . . .	4.9	Ma	9 55 49.720	3.1721	-.0029	+8 26 34.70	17.201	-0.027
$\eta$ Leonis . . . . .	3.6	A0p	10 2 48.496	3.2725	-.0022	+17 10 4.54	17.486	-0.004
$\alpha$ Leonis (Regulus) . .	1.3	B8	10 3 57.221	3.1980	-.0169	-12 22 23.99	17.532	-0.002
$\lambda$ Hydrae . . . . .	3.8	K0	10 6 32.504	+2.9247	-.0137	-11 56 35.89	-17.726	-0.068
$\gamma$ Velorum . . . . .	4.1	A2	10 11 14.886	2.5131	-.0153	-41 42 37.28	17.798	+0.032
32 Ursae Majoris . . .	5.7	A3	10 12 1.438	4.3911	-.0140	+65 31 22.84	17.874	-0.012
$\zeta$ Leonis . . . . .	3.6	F0	10 12 4.638	3.3419	+0.0014	+23 49 53.14	17.872	-0.009
$\lambda$ Ursae Majoris . . .	3.5	A0	10 12 5.897	3.6303	-.0142	+43 19 45.96	17.903	-0.038
$\gamma$ Leonis pr. . . . .	2.6	K0	10 15 23.938	+3.3113	+0.0212	+20 15 42.71	-18.145	-0.152
$\mu$ Ursae Majoris . . .	3.2	K5	10 17 23.446	+3.5852	-.0065	+41 55 2.74	-18.043	+0.027

$\alpha$  Cancri, star 6<sup>m</sup>.6, 30".6 n. pr.  
 $\delta$  Hydrae, triple; binary 3<sup>m</sup>.5, 6<sup>m</sup>.8,  
 0".2, with comp. 7<sup>m</sup>.8, 3".3  
 $\delta$  Argus, comp. 5<sup>m</sup>, 2".4

$\sigma^2$  Cancri, dup. 5<sup>m</sup>.9, 6<sup>m</sup>.4, 1".4  
 $b^1$  Carinae, comp. 7<sup>m</sup>.2, 5".1  
 $\sigma^2$  Urs. Maj., binary 4<sup>m</sup>.9, 8<sup>m</sup>, 1".3

$\delta$  Argus, dup. 3<sup>m</sup>.8, 6<sup>m</sup>.0, 0".8  
 $v$  Ursae, comp. 6<sup>m</sup>.0, 4".9 s. l.  
 $\gamma$  Leonis, comp. 3<sup>m</sup>.8, 3".7 s. l.

# MEAN PLACES OF TEN-DAY STARS, 1917. 223

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spectr- um.	Right Ascension.	Annual Variation.	Annual P. M.	Declination.	Annual Variation.	Annual P. M.
			h m s	s	s	" "	" "	" "
30 H. Ursæ Majoris	4.9	A0	10 18 10.162	+4.3697	-.0024	+65 59 12.23	-18.117	-0.018
μ Hydræ	4.1	K5	10 22 4.536	2.9006	-.0089	-16 24 43.67	18.322	-0.079
31 Leonis Minoris	4.4	K0	10 23 5.378	3.4785	-.0094	+37 7 58.41	18.392	-0.112
α Antliæ	4.4	K5	10 23 21.115	2.7426	-.0060	-30 38 42.55	18.312	-0.023
36 Ursæ Majoris	4.8	F5	10 25 19.572	3.8595	-.0208	+56 24 23.75	18.398	-0.039
9 H. Draconis	5.0	G5	10 28 4.749	+5.1792	-.0084	+76 8 28.04	-18.464	-0.009
ρ Leonis	3.8	B0p	10 28 26.559	3.1614	-.0004	+ 9 44 2.93	18.470	-0.003
33 Sextantis	6.4	K0	10 37 10.837	3.0519	-.0100	- 1 18 16.79	18.861	-0.110
41 Leonis Minoris	5.0	A2	10 38 54.375	3.2668	-.0084	+23 37 23.92	18.794	+0.009
θ Argus	3.0	B0	10 39 59.488	2.1328	-.0043	-63 57 35.70	18.864	-0.027
42 Leonis Minoris	5.4	B9	10 41 15.213	+3.3421	-.0024	+31 7 11.33	-18.915	-0.041
η Argus	†	Pec.	10 41 50.234	2.3212	-.0002	-59 14 52.58	18.900	-0.009
μ Argus	†	G5	10 43 11.758	2.5740	+0.0066	-48 58 53.94	19.011	-0.081
l Leonis	5.3	A0	10 44 53.786	3.1563	+0.0001	+10 59 4.66	19.012	-0.033
δ <sup>2</sup> Chamæleontis	†	B3	10 45 1.016	0.5921	-.0192	-80 6 8.64	18.986	-0.004
ν Hydræ	3.3	Ma	10 45 31.690	+2.9383	+0.0061	-15 45 31.67	-18.786	+0.211
46 Leonis Minoris	3.9	K0	10 48 40.473	3.3630	+0.0074	+34 39 45.71	19.365	-0.283
54 Leonis	†	A5	10 51 7.318	3.2527	-.0060	+25 11 33.92	19.165	-0.018
ι Antliæ	4.7	K0	10 52 51.107	2.7963	+0.0112	-36 41 28.88	19.329	-0.138
Groombridge 1706	6.3	G5	10 53 21.248	4.8827	-.0264	+78 12 54.54	19.239	-0.035
α Crateris	4.2	K0	10 55 43.737	+2.9208	-.0327	-17 51 24.26	-19.155	+0.108
d Leonis	5.0	K0	10 56 16.480	3.0991	+0.0004	+ 4 3 48.08	19.298	-0.022
β Ursæ Majoris	2.4	A0	10 56 50.595	3.6394	+0.0105	+56 49 39.35	19.263	+0.026
α Ursæ Majoris	2.0	K0	10 58 37.132	3.7270	-.0164	+62 11 57.70	19.402	-0.071
χ Leonis	4.7	F0	11 0 44.205	3.0960	-.0234	+ 7 47 6.38	19.420	-0.041
p <sup>4</sup> Leonis	5.7	K0	11 2 40.246	+3.0612	-.0253	+ 2 24 23.26	-19.502	-0.080
ψ Ursæ Majoris	3.2	K0	11 5 0.238	3.3844	-.0053	+44 56 56.81	19.504	-0.033
β Crateris	4.5	A2	11 7 34.425	2.9478	.0000	-22 22 21.40	19.630	-0.106
δ Leonis	2.6	A2	11 9 41.824	3.1950	+0.0108	+20 58 43.01	19.705	-0.141
θ Leonis	3.4	A0	11 9 53.160	3.1503	-.0049	+15 53 0.32	19.653	-0.085
ν Ursæ Majoris	3.7	K0	11 13 59.997	+3.2475	-.0018	+33 32 50.74	-19.617	+0.026
δ Crateris	3.8	K0	11 15 11.376	2.9975	-.0088	-14 19 45.19	19.468	+0.195
σ Leonis	4.1	A0	11 16 51.460	3.0949	-.0062	+ 6 29 4.09	19.704	-0.013
π Centauri	4.3	B5	11 17 12.999	2.7267	-.0041	-54 2 9.66	19.710	-0.013
ι Leonis	†	F0	11 19 35.891	3.1285	+0.0103	+10 59 11.67	19.818	-0.083
τ Leonis	5.2	K0	11 23 40.156	+3.0857	+0.0008	+ 3 18 48.67	-19.811	-0.016
λ Draconis	4.1	Ma	11 26 29.629	3.5042	-.0072	+69 47 21.55	19.852	-0.021
ξ Hydræ	3.7	G5	11 28 55.004	2.9466	-.0158	-31 23 54.02	19.916	-0.055
λ Centauri	3.3	B9	11 31 56.642	2.7511	-.0073	-62 33 37.87	19.922	-0.027
υ Leonis	4.5	K0	11 32 41.941	3.0716	.0000	- 0 21 55.34	19.864	+0.039
π Chamæleontis	5.7	F0	11 33 49.733	+2.4542	-.0323	-75 26 13.46	-19.937	-0.023
3 Draconis	5.5	K0	11 37 51.393	3.3714	-.0080	+67 12 15.59	19.917	+0.035
ζ Crateris	4.9	G5	11 40 33.229	3.0379	+0.0018	-17 53 21.29	20.014	-0.041
χ Ursæ Majoris	3.8	K0	11 41 40.449	3.1794	-.0128	+48 14 22.74	19.961	+0.020
β Leonis ( <i>Denebola</i> )	2.2	A2	11 44 49.653	3.0623	-.0341	+15 2 9.92	20.126	-0.118
β Virginis	3.8	F8	11 46 22.311	+3.1252	+0.0494	+ 2 13 57.16	-20.284	-0.275
Groombridge 1830	6.5	G5	11 48 12.010	3.4671	+0.0018	+38 18 52.10	25.802	-5.784
γ Ursæ Majoris	2.5	A0	11 49 28.353	3.1691	+0.0115	+54 9 22.47	20.020	+0.004
π Virginis	4.6	A3	11 56 37.180	3.0742	-.0009	+ 7 4 37.72	20.075	-0.032
α Virginis	4.2	G5	12 0 58.908	3.0570	-.0148	+ 9 11 37.95	20.013	+0.032
δ Centauri	2.9	B3p	12 4 2.987	+3.0960	-.0050	-50 15 37.19	-20.072	-0.030
ε Corvi	3.2	K0	12 5 51.206	3.0815	-.0051	-22 9 29.59	20.036	+0.003
4 H. Draconis	5.1	A5	12 8 19.650	2.8453	+0.0026	+78 4 38.71	20.013	+0.019
δ Crucis	3.1	B3	12 10 44.064	3.1760	+0.0021	-58 17 15.32	20.062	-0.038
δ Ursæ Majoris	3.4	A2	12 11 19.618	2.9840	+0.0150	+57 29 37.50	20.016	+0.005
γ Corvi	2.8	B8	12 11 32.104	+3.0819	-.0114	-17 4 51.83	-20.063	+0.017
2 Canum Venaticorum	†	K5	12 11 58.355	+3.0156	+0.0038	+41 7 19.27	-20.064	-0.046

γ Argus, var., irreg., 1<sup>m</sup>.6-6<sup>m</sup>.6  
 μ Argus, comp. 7<sup>m</sup>, 2<sup>m</sup>.2 n. f.

δ<sup>2</sup> Cham., star 5<sup>m</sup>.5 pr. 32<sup>m</sup>, 256<sup>m</sup> n.  
 54 Leonis, comp. 6<sup>m</sup>.3, 6<sup>m</sup>.4 s. f.

ι Leonis, comp. 6<sup>m</sup>.8, 2<sup>m</sup>.6 n. f.  
 2 Can. Ven., star 8<sup>m</sup>, 11<sup>m</sup>.6 s. pr.

# 224 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spectr- um.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>"</sup>
$\beta$ Chamæleontis . . .	4.4	B5	12 13 26.825	+3.4515	-.0188	-78 51 4.93	-19.994	+0.017
$\eta$ Virginis . . .	4.0	A0	12 15 39.568	3.0694	-.0036	-0 12 20.31	20.026	-0.027
$\alpha^1$ Crucis . . .	1.6	B1	12 21 58.181	3.3134	-.0064	-62 38 21.43	19.993	-0.039
$\alpha^2$ Crucis . . .	2.1		$\Delta\alpha + 0.628$	....	....	$\Delta\delta - 1.87$	....	....
20 Comæ . . .	5.7	A2	12 25 33.217	3.0181	+0.0036	+21 21 20.18	19.957	-0.036
$\delta$ Corvi . . .	3.1	A0	12 25 34.065	+3.1014	-0.0140	-16 3 12.48	-20.069	-0.149
$\gamma$ Crucis . . .	1.6	Mb	12 26 33.028	3.3046	-.0028	-56 38 54.24	20.172	-0.261
$\gamma$ Canum Venaticorum . . .	4.3	G0	12 29 48.338	2.8560	-.0617	+41 48 29.82	19.957	+0.279
$\kappa$ Draconis . . .	3.9	B5p	12 29 56.924	2.5766	-.0112	+70 14 44.25	19.864	+0.010
$\beta$ Corvi . . .	2.8	G5	12 30 1.405	3.1458	-.0008	-22 56 16.40	19.935	-0.061
24 Comæ seq. . .	5.2	K0	12 30 58.031	+3.0106	-.0007	+18 50 1.51	-19.850	+0.013
$\alpha$ Muscæ . . .	2.9	B3	12 32 13.073	3.5436	-.0083	-68 40 42.18	19.876	-0.029
$\chi$ Virginis . . .	4.8	K0	12 34 57.636	3.0939	-.0056	-7 32 20.34	19.843	-0.031
$\gamma$ Centauri . . .	2.4	A0	12 36 55.952	3.2855	-.0196	-48 30 15.08	19.805	-0.020
$\gamma$ Virginis (mean) . . .	2.9	F0	12 37 27.290	3.0899	-.0365	-0 59 39.62	19.774	+0.004
$\rho$ Virginis . . .	5.0	A0	12 37 41.049	+3.0372	+0.0058	+10 41 33.89	-19.882	-0.107
76 Ursæ Majoris . . .	5.9	A0	12 37 56.652	2.6307	-.0065	+63 10 6.88	19.790	-0.018
$\beta$ Crucis . . .	1.5	B1	12 42 51.646	3.4836	-.0064	-59 14 7.14	19.729	-0.033
31 Comæ . . .	5.1	G0	12 47 39.407	2.9238	-.0022	+27 59 31.52	19.638	-0.024
$\eta$ Centauri . . .	4.3	A5	12 48 50.062	3.3135	+0.0060	-39 43 39.77	19.626	-0.035
$\epsilon$ Ursæ Majoris (Alioth) . . .	1.7	A0p	12 50 22.936	+2.6477	+0.0138	+56 24 36.46	-19.576	-0.013
$\delta$ Virginis . . .	3.7	Ma	12 51 25.308	3.0209	-.0318	+3 50 53.79	19.603	-0.060
$\alpha$ Canum Venat. seq. . .	2.9	A0p	12 52 8.856	2.8103	-.0203	+38 45 58.99	19.480	+0.049
$\delta$ Muscæ . . .	3.6	K2	12 56 32.256	4.0755	+0.0496	-71 6 5.16	19.470	-0.031
$\epsilon$ Virginis . . .	3.0	K0	12 58 2.714	2.9865	-.0186	+11 24 17.96	19.391	+0.015
$\theta$ Virginis . . .	4.4	A0	13 5 39.035	+3.1034	-.0029	-5 5 46.26	-19.669	-0.040
43 Comæ . . .	4.3	G0	13 8 0.119	2.8024	-.0599	+28 17 55.05	18.291	+0.879
20 Canum Venaticorum . . .	4.7	F0	13 13 49.448	2.6954	-.0094	+41 0 33.61	18.999	+0.015
$\gamma$ Hydræ . . .	3.3	G5	13 14 24.338	3.2559	+0.0046	-22 44 2.20	19.051	-0.053
$\epsilon$ Centauri . . .	2.9	A2	13 15 55.465	3.3623	-.0294	-36 16 29.40	19.052	-0.097
$\zeta^1$ Ursæ Maj. (Mizar) . . .	2.4	A0p	13 20 35.249	+2.4218	+0.0153	+55 21 30.68	-18.848	-0.080
$\zeta^2$ Ursæ Majoris . . .	4.0	A0	$\Delta\alpha + 0.916$	....	....	$\Delta\delta - 12.40$	....	....
$\alpha$ Virginis (Spica) . . .	1.2	B2	13 20 49.090	3.1573	-.0028	-10 43 42.19	18.844	-0.032
Groombridge 2001 . . .	6.1	K5	13 24 0.915	1.5244	+0.0012	+72 49 19.90	18.732	-0.019
70 Virginis . . .	5.2	G5	13 24 22.227	2.9340	-.0168	+14 13 18.23	19.286	-0.584
$\zeta$ Virginis . . .	3.4	A2	13 30 27.735	+3.0546	-.0195	-0 10 18.77	-18.465	+0.089
17 H. Canum Venaticorum . . .	5.0	F0	13 31 5.572	2.6815	+0.0073	+37 36 26.55	18.487	-0.004
$\epsilon$ Centauri . . .	2.6	B1	13 34 37.129	3.7814	-.0039	-53 2 41.91	18.400	-0.039
$m$ Virginis . . .	5.2	Ma	13 37 15.201	3.1454	-.0073	-8 17 4.56	18.235	+0.032
$\tau$ Boötis . . .	4.5	F5	13 43 19.071	2.8508	-.0341	+17 52 11.79	18.016	+0.026
$\eta$ Ursæ Majoris (Alkaid) . . .	1.9	B3	13 44 16.341	+2.3678	-.0118	+49 43 37.57	-18.029	-0.023
89 Virginis . . .	5.1	K0	13 45 21.487	3.2544	-.0077	-17 43 16.12	18.005	-0.040
$\zeta$ Centauri . . .	3.1	B2p	13 50 21.223	3.7266	-.0070	-46 52 49.39	17.830	-0.064
$\eta$ Boötis . . .	2.8	G0	13 50 43.968	2.8567	-.0044	+18 48 47.97	18.114	-0.363
$\theta$ Apodis . . .	var.	Mb	13 57 11.699	5.7459	-.0293	-76 23 48.82	17.510	-0.029
11 Boötis . . .	6.1	A3	13 57 24.729	+2.7215	-.0060	+27 47 13.03	-17.467	+0.005
$\tau$ Virginis . . .	4.3	A2	13 57 25.268	3.0514	+0.0010	+1 56 44.56	17.500	-0.029
$\beta$ Centauri . . .	0.9	B1	13 57 57.232	4.2075	-.0033	-59 58 23.52	17.482	-0.033
$\pi$ Hydræ . . .	3.5	K0	14 1 38.444	3.4099	+0.0031	-26 16 59.18	17.434	-0.146
$\theta$ Centauri . . .	2.3	K0	14 1 47.518	3.5203	-.0437	-35 57 43.84	17.806	-0.525
$\alpha$ Draconis . . .	3.6	A0	14 2 8.553	+1.6245	-.0071	+64 46 20.01	-17.254	+0.011
$d$ Boötis . . .	4.8	F5	14 6 36.864	2.7370	-.0014	+25 29 3.30	17.141	-0.078
$\kappa$ Virginis . . .	4.3	K0	14 8 27.955	+3.1971	+0.0006	-9 53 16.58	16.846	+0.132
4 Ursæ Minoris . . .	5.0	K0	14 9 9.051	-0.2786	-.0108	+77 56 14.88	16.920	+0.026
$\epsilon$ Virginis . . .	4.2	F5	14 11 39.592	+3.1426	-.0013	-5 36 17.81	17.255	-0.427
$\alpha$ Boötis (Arcturus) . . .	0.2	K0	14 11 52.501	+2.7356	-.0779	+19 36 50.39	-18.821	-2.003
$\lambda$ Boötis . . .	4.3	A0	14 13 13.805	+2.2830	-.0172	+46 28 8.27	-16.802	+0.151

$\delta$  Corvi, star 8<sup>m</sup>, 24".4 s. pr.  
 $\gamma$  Crucis, star 6<sup>m</sup>.6, 85" n. f.  
 24 Comæ, star 6<sup>m</sup>.7, 20".6 pr.  
 $\gamma$  Cent., dup., 3=1, 3=1, 1".7

$\gamma$  Virginis, binary, 3<sup>m</sup>.7, 3<sup>m</sup>.7, 6".2,  
 P=328<sup>s</sup>  
 $\alpha$  Can. Ven., star 5<sup>m</sup>, 19".8 s. pr.  
 $\theta$  Virginis, comp. 9<sup>m</sup>, 7".1 n. pr.

$\zeta$  Urs. Maj., star Alcor 4<sup>m</sup>.0, f. 79<sup>m</sup>.2  
 222" n.  
 $\theta$  Apodis, var. irreg., 5=5-6<sup>m</sup>.6

# MEAN PLACES OF TEN-DAY STARS, 1917. 225

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	° ' "	"	"
λ Virginis . . . . .	4.6	A2	14 14 36.912	+3.2411	-.0024	-12 59 22.71	-16.645	+0.021
2 Libræ . . . . .	6.3	K0	14 18 57.478	3.2240	-.0014	-11 20 7.90	16.539	-0.067
θ Boötis . . . . .	4.1	F8	14 22 22.329	2.0433	-.0254	+52 14 2.20	16.706	-0.405
f Boötis . . . . .	5.4	A5	14 22 35.703	2.7901	-.0052	+19 35 58.11	16.274	+0.015
φ Virginis . . . . . †	5.0	K0	14 23 55.458	+3.0891	-.0090	- 1 51 23.14	16.225	-0.004
5 Ursæ Minoris . . . . .	4.4	K2	14 27 40.979	-0.1604	+0.0022	+76 3 54.14	-16.004	+0.021
ρ Boötis . . . . .	3.8	K0	14 28 15.208	+2.5865	-.0073	+30 44 6.73	15.882	+0.113
γ Boötis . . . . .	3.0	F0	14 28 44.200	2.4171	-.0091	+38 40 14.90	15.835	+0.145
η Centauri . . . . .	2.6	B3p	14 30 13.824	3.7977	-.0032	-41 47 37.92	15.922	-0.032
σ Boötis . . . . .	4.5	F0	14 31 4.036	2.6181	+0.150	+30 6 18.60	15.721	+0.126
α Centauri . . . . . †	0.1	G0	14 33 57.052	+4.0561	-.4861	-60 29 36.71	-14.967	+0.728
33 Boötis . . . . .	5.4	A0	14 35 44.969	2.2341	-.0056	+44 45 43.53	15.635	-0.043
α Apodis . . . . .	3.8	K5	14 37 28.968	7.3038	-.0068	-78 41 37.47	15.520	-0.024
μ Virginis . . . . .	4.0	F5	14 38 41.050	3.1588	+0.0071	- 5 17 52.80	15.751	-0.322
ε Boötis . . . . . †	2.7	K0p	14 41 21.734	2.6203	-.0035	+27 25 24.57	15.269	+0.009
109 Virginis . . . . .	3.8	A0	14 42 3.086	+3.0313	-.0074	+ 2 14 31.17	-15.274	-0.035
8 Libræ . . . . .	5.3	F5	14 46 5.561	3.3136	-.0073	-15 39 10.04	15.061	-0.074
α Libræ . . . . .	2.9	A2	14 46 17.008	3.3141	-.0078	-15 41 51.20	15.073	-0.077
Groombridge 2164 . . . . .	5.7	K2	14 49 19.924	+1.5204	-.0165	+59 37 51.22	14.701	+0.118
β Ursæ Minoris . . . . .	2.2	K5	14 50 56.060	-0.2026	-.0065	+74 29 40.81	14.721	+0.003
ε <sup>2</sup> Libræ . . . . .	5.6	K0	14 52 15.680	+3.2507	-.0006	-11 4 31.52	-14.646	-0.001
Piazzi 221 . . . . .	5.8	A0	14 52 18.093	2.8298	-.0021	+14 46 51.83	14.663	-0.011
β Lupi . . . . .	2.8	B2p	14 53 5.179	3.9139	-.0070	-42 48 2.05	14.658	-0.062
δ Libræ . . . . . †	var.	A0	14 56 32.093	3.2015	-.0051	- 8 11 25.13	14.402	-0.015
β Boötis . . . . .	3.6	G5	14 58 49.182	2.2600	-.0036	+40 43 2.45	14.287	-0.040
γ Scorpii . . . . .	3.4	Ma	14 59 12.512	+3.5052	-.0056	-24 57 23.19	-14.271	-0.048
φ Boötis . . . . .	4.7	K0	15 0 53.334	2.5704	-.0133	+27 16 14.23	14.133	-0.014
c Boötis . . . . .	5.0	F0	15 3 39.326	2.6347	+0.136	+25 11 30.10	14.131	-0.184
ζ Lupi . . . . .	3.5	K0	15 6 18.818	4.2928	-.0126	-51 47 2.64	13.844	-0.066
i Libræ . . . . .	4.7	A0p	15 7 29.193	3.4145	-.0031	-19 28 42.58	13.767	-0.063
3 Serpentis . . . . .	5.4	K0	15 11 3.707	+2.9801	-.0017	+ 5 14 48.40	-13.478	-0.005
γ Trianguli Australis . . . . .	3.1	A0	15 11 8.361	5.5554	-.0137	-68 22 27.17	13.510	-0.042
δ Boötis . . . . .	3.5	K0	15 12 9.406	2.4193	+0.0075	+33 37 25.59	13.528	-0.126
β Libræ . . . . .	2.7	B8	15 12 32.293	+3.2251	-.0066	- 9 4 38.73	13.402	-0.024
γ Ursæ Minoris . . . . .	3.1	A2	15 20 51.060	-0.1143	-.0020	+72 7 45.49	12.815	+0.013
μ Boötis pr. . . . . †	4.5	F0	15 21 21.295	+2.2664	-.0121	+37 40 3.51	-12.713	+0.081
τ Serpentis . . . . .	5.5	Ma	15 21 56.323	2.7801	-.0024	+15 43 8.76	12.778	-0.024
ι Draconis . . . . .	3.5	K0	15 23 4.993	1.3336	+0.014	+59 15 22.97	12.668	+0.010
32 Libræ . . . . .	5.9	K0	15 23 34.354	3.3790	+0.006	-16 25 40.70	12.687	-0.043
β Coronæ Borealis . . . . .	3.7	Fp	15 24 24.423	2.4738	-.0130	+29 23 28.09	12.509	+0.078
γ <sup>1</sup> Boötis . . . . .	5.2	K5	15 27 56.882	+2.1552	+0.0016	+41 6 55.34	-12.359	-0.014
γ Lupi (mean) . . . . . †	3.0	B3	15 29 36.230	3.9875	-.0020	-40 53 20.03	12.279	-0.049
γ Libræ . . . . .	4.0	K0	15 30 52.856	3.3526	+0.0047	-14 30 48.31	12.135	+0.006
α Coronæ Borealis . . . . .	2.3	A0	15 31 10.392	2.5395	+0.0090	+26 59 35.81	12.221	-0.100
ζ Coronæ Borealis seq. †	5.1	B8	15 36 15.152	2.2596	-.0005	+36 54 16.73	11.776	-0.012
α Serpentis . . . . .	2.8	K0	15 40 10.702	+2.9532	+0.0089	+ 6 41 9.49	-11.442	+0.042
β Serpentis . . . . .	3.7	A2	15 42 21.414	2.7686	+0.0054	+15 40 50.67	11.383	-0.055
κ Serpentis . . . . .	4.3	K5	15 45 0.164	2.6966	-.0035	+18 23 49.35	11.236	-0.099
μ Serpentis . . . . .	3.6	A0	15 45 17.206	3.1286	-.0058	- 3 10 37.38	11.144	-0.028
12 H. Draconis . . . . .	5.1	A2	15 45 23.868	0.9076	+0.0047	+62 51 20.66	11.176	-0.068
ε Serpentis . . . . .	3.8	A0	15 46 40.625	+2.9885	+0.0081	+ 4 43 36.86	-10.945	+0.070
ζ Ursæ Minoris . . . . .	4.3	A2	15 46 59.691	-2.1997	+0.0082	+78 3 1.37	10.995	-0.004
β Trianguli Australis . . . . .	3.0	F0	15 47 49.006	+5.2589	-.0290	-63 10 32.92	11.339	-0.408
λ Libræ . . . . .	5.1	B3	15 48 30.751	3.4777	-.0017	-19 55 12.01	10.926	-0.046
γ Serpentis . . . . .	3.9	F8	15 52 37.106	2.7698	+0.0212	+15 55 54.25	11.865	-1.289
π Scorpii . . . . .	3.0	B2p	15 53 49.642	+3.6241	-.0010	-25 52 34.10	-10.535	-0.048
ε Coronæ Borealis . . . . .	4.2	K0	15 54 9.009	+2.4824	-.0065	+27 7 2.90	-10.530	-0.067

♂ Virginis, comp. 9<sup>m</sup>. 4<sup>m</sup>. 5 a. f.  
 ε Boötis, comp. 5<sup>m</sup>. 1<sup>m</sup>. 2<sup>m</sup>. 8 n. pr.

δ Libræ, var., 24.33, 4<sup>m</sup>. 8-6=2  
 μ Boötis, star 6<sup>m</sup>. 7, 108<sup>m</sup>. a.

γ Lupi, binary 3=7, 3=9, 0<sup>m</sup>. 4  
 ζ Cor. Bor., comp. 6=0, 6<sup>m</sup>. 2 n. pr.

α Centauri, dup., 0=3, 1=7; companion a. pr. The position given is that of the center of gravity of the system.  
 Corrections given on page xii remain to be applied to reduce to the position of α<sup>2</sup> Centauri.



## 226 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>"</sup>
δ Scorpii . . . . .	2.5	B1p	15 55 25.331	+3.5426	-.0011	-22 23 11.19	-10.402	-0.035
θ Draconis . . . . .	4.1	F8	16 0 19.978	1.1219	-.0391	+58 47 11.79	9.659	+0.339
β Scorpii . . . . .	2.9	B1	16 0 36.440	3.4838	-.0011	-19 34 45.00	10.005	-0.028
κ Herculis . . . . .	5.3	G5	16 4 19.637	2.7052	-.0039	+17 16 1.45	9.716	-0.023
Groombridge 2320 . . . . .	5.4	A0	16 6 5.472	0.1536	-.0074	+68 1 43.00	9.506	+0.052
φ Herculis . . . . .	4.3	A0	16 6 9.264	+1.8898	-.0017	+45 9 7.12	-9.517	+0.036
δ <sup>1</sup> Apodis . . . . .	4.8	Mb	16 7 53.722	8.8602	-.0050	-78 29 20.42	9.474	-0.056
δ Ophiuchi . . . . .	3.0	Ma	16 9 59.656	3.1416	-.0031	-3 28 53.21	9.401	-0.144
σ Coronæ Bor. seq. . . . .	5.8	G0	16 11 34.188	+2.2459	-.0223	+34 4 6.39	9.206	-0.071
19 Ursæ Minoris . . . . .	5.5	B8	16 13 10.417	-1.7458	+0.0007	+76 5 13.09	9.001	+0.008
γ <sup>2</sup> Normæ . . . . .	4.1	K0	16 13 37.194	+4.4728	-.0216	-49 57 11.27	-9.038	-0.064
ε Ophiuchi . . . . .	3.3	K0	16 13 55.670	3.1720	+0.0054	-4 29 27.83	8.913	+0.037
σ Scorpii . . . . .	3.1	B1	16 16 8.421	3.6419	-.0011	-25 23 40.82	8.815	-0.039
τ Herculis . . . . .	3.9	B5	16 17 14.756	1.8032	+0.0001	+46 30 37.45	8.660	+0.029
γ Herculis . . . . .	3.8	F0	16 18 15.476	+2.6455	-.0034	+19 20 49.87	8.573	+0.037
η Ursæ Minoris . . . . .	5.0	F0	16 19 54.741	-1.7882	-.0231	+75 56 49.54	-8.226	+0.252
γ Apodis . . . . .	3.9	K0	16 20 40.624	+9.1087	-.0409	-78 42 47.43	8.500	-0.083
ω Herculis . . . . .	4.5	Ap	16 21 34.845	2.7619	-.0028	+14 13 24.78	8.405	-0.059
η Draconis . . . . .	2.9	G5	16 22 51.890	0.8082	-.0020	+61 42 6.46	8.186	+0.058
α Scorpii (Antares) . . . . .	1.2	Map	16 24 18.923	3.6744	-.0006	-26 14 55.76	8.156	-0.028
β Herculis . . . . .	2.8	K0	16 26 39.031	+2.5775	-.0076	+21 40 10.50	-7.966	-0.025
λ Ophiuchi . . . . .	3.8	A0	16 26 43.554	+3.0240	-.0022	+2 9 52.94	8.014	-0.079
Δ Draconis . . . . .	5.0	B8p	16 28 8.325	-0.1289	-.0049	+68 56 51.84	7.785	+0.036
τ Scorpii . . . . .	2.9	B0	16 30 42.742	+3.7299	-.0013	-28 2 41.64	7.648	-0.034
σ Herculis . . . . .	4.2	A0	16 31 25.615	1.9336	-.0006	+42 36 26.80	7.530	+0.026
ζ Ophiuchi . . . . .	2.7	B0	16 32 35.194	+3.3010	+0.0007	-10 23 59.67	-7.439	+0.022
24 Scorpii . . . . .	5.0	K0	16 36 46.219	3.4668	-.0017	-17 34 56.80	7.125	-0.004
ζ Herculis . . . . .	3.0	G0	16 38 9.418	2.2614	-.0364	+31 45 8.88	6.617	+0.390
α Trianguli Australis . . . . .	1.9	K2	16 39 51.756	6.3253	+0.0028	-68 52 37.47	6.917	-0.049
η Herculis . . . . .	3.6	K0	16 40 2.984	2.0558	+0.0031	+39 4 45.77	6.945	-0.093
Groombridge 2377 . . . . .	4.9	F0	16 43 43.346	+1.1375	+0.0046	+56 55 47.51	-6.487	+0.062
ε Scorpii . . . . .	2.4	K0	16 44 47.028	3.8801	-.0505	-34 8 37.71	6.725	-0.264
49 Herculis . . . . .	6.4	A0	16 48 18.083	2.7303	+0.0010	+15 6 45.09	6.183	-0.014
ε <sup>1</sup> Aræ . . . . .	4.2	K2	16 52 57.748	4.7718	-.0011	-53 2 3.96	5.797	-0.017
κ Ophiuchi . . . . .	3.4	K0	16 53 44.315	2.8383	-.0199	+9 30 11.40	5.726	-0.011
30 Ophiuchi . . . . .	5.0	K0	16 56 40.999	+3.1630	-.0018	-4 5 56.57	-5.543	-0.076
ε Herculis . . . . .	3.9	A0	16 57 6.805	2.2947	-.0036	+31 2 52.31	5.408	+0.023
d Herculis . . . . .	5.3	A2	16 58 32.416	2.2121	-.0016	+33 41 15.49	5.320	-0.009
η Ophiuchi . . . . .	2.6	A0	17 5 36.950	3.4376	+0.0017	-15 37 23.24	4.621	+0.091
η Scorpii . . . . .	3.4	F2	17 6 12.319	4.2926	+0.0023	-43 7 52.14	4.968	-0.306
ζ Draconis . . . . .	3.2	B5	17 8 32.643	+0.1693	-.0021	+65 49 0.27	-4.445	+0.018
α Herculis . . . . .	var.	Mb	17 10 51.730	2.7345	-.0008	+14 29 2.46	4.235	+0.029
δ Herculis . . . . .	3.2	A0	17 11 37.296	2.4632	-.0019	+24 56 10.61	4.358	-0.158
π Herculis . . . . .	3.4	K2	17 12 9.316	2.0885	-.0025	+36 54 7.14	4.155	-0.001
ω Ophiuchi . . . . .	3.4	B3	17 16 54.620	3.6819	-.0006	-24 55 4.13	3.782	-0.086
w Herculis . . . . .	5.4	G0	17 17 33.166	+2.2430	+0.0096	+32 34 25.28	-4.738	-1.047
β Aræ . . . . .	2.8	K2	17 18 23.824	4.9813	-.0004	-55 27 9.79	3.646	-0.027
b Ophiuchi . . . . .	4.3	F0	17 21 17.948	3.6610	-.0009	-24 6 0.68	3.506	-0.137
σ Ophiuchi . . . . .	4.4	K0	17 22 23.753	2.9757	+0.0002	+4 12 41.90	3.296	+0.008
δ Aræ . . . . .	3.8	B8	17 23 36.038	5.4063	-.0008	-60 36 59.05	3.260	-0.120
α Aræ . . . . .	3.0	B3p	17 25 25.373	+4.6332	-.0036	-49 48 42.21	-3.096	-0.083
λ Herculis . . . . .	4.5	K0	17 27 23.022	2.4241	+0.0016	+26 10 20.76	2.825	+0.018
λ Scorpii . . . . .	1.7	B2	17 27 58.232	4.0711	-.0004	-37 2 39.60	2.820	-0.027
β Draconis . . . . .	3.0	G0	17 28 33.393	1.3543	-.0017	+52 21 44.46	2.733	+0.009
α Ophiuchi . . . . .	2.1	A5	17 31 4.857	2.7838	+0.0080	+12 37 10.14	2.758	-0.235
ξ Serpentinis . . . . .	3.6	A5	17 32 49.942	+3.4330	-.0038	-15 20 50.00	-2.431	-0.060
ι Herculis . . . . .	3.8	B3	17 37 7.326	+1.6936	+0.0003	+46 2 59.82	-1.995	+0.003

β Scorpii, comp. 5=1, 13".3 n. f.  
 κ Herculis, star 6=5, 29".7 n. f.  
 σ Cor. Bor., comp. 6=7, 4".6 s. pr.  
 σ Scorpii, star 8=, 21" pr.  
 γ Draconis, comp. 8=, 5".4 s. f.

α Scorpii, comp. 7=, 3".2 pr.  
 λ Ophiuchi, comp. 6=, 1".2 n. f.  
 ζ Herculis, binary, 3=0, 6=0, 1"  
 η Oph., binary, 3=2, 3=7, 0".5

α Herculis, var. irreg., 3=1-3=9, dup.  
 comp. 6=, 4".6 s. f.  
 δ Herculis, binary, comp. 8=, 12"  
 s. pr.



# MEAN PLACES OF TEN-DAY STARS, 1917. 227

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	" ' "	"	"
$\omega$ Draconis . . . . .	4.9	F5	17 37 26.140	-0.3540	+0.0014	+68 47 47.02	-1.652	+0.318
$\eta$ Pavonis . . . . .	3.6	K0	17 37 34.919	+5.8816	-.0028	-64 41 9.06	2.038	-0.080
$\beta$ Ophiuchi . . . . .	2.9	K0	17 39 22.313	2.9629	-.0026	+ 4 36 3.81	1.644	+0.158
$\iota^1$ Scorpii . . . . .	3.1	F5p	17 41 46.752	4.1948	+0.0006	-40 5 45.73	1.600	-0.008
$\mu$ Herculis . . . . .	3.5	G5	17 43 12.573	+2.3471	-.0238	+27 46 6.42	2.216	-0.749
$\phi$ Draconis . . . . .	4.9	F5	17 43 24.658	-1.0738	+0.0024	+72 11 23.68	-1.718	-0.268
$\gamma$ Ophiuchi . . . . .	3.7	A0	17 43 43.813	+3.0073	-.0016	+ 2 44 15.38	1.495	-0.073
89 Herculis . . . . .	5.5	F2	17 52 4.310	2.4207	+0.0013	+26 3 44.75	0.688	+0.006
$\epsilon$ Draconis . . . . .	3.9	K0	17 52 5.684	+1.0381	+0.0131	+56 53 7.24	0.615	+0.077
35 Draconis . . . . .	5.0	F5	17 53 9.799	-2.6900	+0.0116	+76 58 28.71	0.355	+0.243
$\theta$ Herculis . . . . .	4.0	K0	17 53 24.377	+2.0571	+0.0006	+37 15 38.91	-0.572	+0.004
$\nu$ Ophiuchi . . . . .	3.5	K0	17 54 27.394	3.3019	-.0006	- 9 45 51.93	0.604	-0.120
$\epsilon$ Herculis . . . . .	3.8	K0	17 54 32.377	2.3315	+0.0072	+29 15 21.90	0.495	-0.018
$\gamma$ Draconis . . . . .	2.4	K5	17 54 40.717	1.3926	-.0006	+51 29 53.36	0.489	-0.024
67 Ophiuchi . . . . .	3.9	B5p	17 56 29.302	3.0049	+0.0008	+ 2 56 4.66	0.320	-0.013
$\theta$ Aræ . . . . .	3.9	B1	18 0 10.166	+4.6699	-.0010	-50 5 54.79	-0.036	-0.050
$\gamma$ Sagittarii . . . . .	3.1	K0	18 0 28.482	3.8520	-.0035	-30 25 34.56	0.156	-0.198
70 Ophiuchi . . . . .	4.1	K0	18 1 15.559	3.0317	+0.0178	+ 2 31 3.87	-1.012	-1.123
72 Ophiuchi . . . . .	3.7	A2	18 3 24.848	2.8433	-.0045	+ 9 33 4.42	+0.386	+0.087
$\alpha$ Herculis . . . . .	3.8	A0	18 4 18.259	2.3395	-.0002	+28 45 0.95	0.378	+0.002
$\mu$ Sagittarii . . . . .	4.0	B8p	18 8 47.943	+3.5870	-.0004	-21 4 53.84	+0.768	-0.003
$\eta$ Sagittarii . . . . .	3.2	Mb	18 12 0.696	4.0597	-.0109	-36 47 15.14	0.898	-0.152
Groombridge 2533 . . . . .	5.4	B5	18 13 3.849	1.8652	-.0006	+42 7 49.53	1.141	-0.001
36 Draconis . . . . .	5.0	F5	18 13 25.151	0.3456	+0.0535	+64 22 8.30	1.199	+0.026
$\delta$ Sagittarii . . . . .	2.8	K0	18 15 40.823	3.8405	+0.0023	-29 51 52.34	1.337	-0.034
$\eta$ Serpentis . . . . .	3.4	K0	18 17 0.847	+3.1028	-.0378	- 2 55 16.45	+0.795	-0.692
$\epsilon$ Sagittarii . . . . .	2.0	A0	18 18 39.755	3.9814	-.0041	-34 25 29.56	1.508	-0.123
109 Herculis . . . . .	3.9	K0	18 20 9.641	2.5560	+0.0139	+21 43 51.57	1.500	-0.261
$\alpha$ Telescopii . . . . .	3.8	B3	18 20 49.165	+4.4999	-.0017	-46 0 55.68	1.750	-0.068
$\chi$ Draconis . . . . .	3.7	F8	18 22 33.352	-1.0787	+0.1177	+72 41 49.41	1.598	-0.373
$\lambda$ Sagittarii . . . . .	2.9	K0	18 22 50.911	+3.7027	-.0033	-25 28 7.64	+1.796	-0.199
$\epsilon$ Serpentis . . . . .	5.4	G5	18 25 21.795	3.1215	+0.0015	- 2 2 23.78	2.179	-0.035
1 Aquilæ . . . . .	4.1	K0	18 30 41.420	3.2646	-.0013	- 8 18 11.05	2.361	-0.315
$\zeta$ Pavonis . . . . .	4.1	K0	18 33 20.434	7.0190	-.0057	-71 30 4.20	2.741	-0.165
$\alpha$ Lyrae ( <i>Vega</i> ) . . . . .	0.1	A0	18 34 7.695	2.0314	+0.0178	+38 42 20.61	3.254	+0.280
2 Aquilæ . . . . .	4.7	F0	18 37 43.817	+3.2866	+0.0020	- 9 7 58.66	+3.279	-0.006
$\phi$ Sagittarii . . . . .	3.3	B8	18 40 28.264	3.7486	+0.0034	-27 4 37.80	3.515	-0.006
110 Herculis . . . . .	4.3	F5	18 42 5.321	2.5804	-.0019	+20 27 57.52	3.317	-0.344
6 Aquilæ . . . . .	4.5	G0	18 42 46.231	3.1829	-.0009	- 4 50 15.57	3.696	-0.023
$\lambda$ Pavonis . . . . .	4.4	B2	18 44 31.787	5.5655	-.0030	-62 17 3.04	3.848	-0.022
$\beta$ Lyrae . . . . .	var.	B2p	18 47 0.919	+2.2148	+0.0004	+33 15 56.11	+4.078	-0.005
50 Draconis . . . . .	5.4	A0	18 49 3.584	-1.9211	-.0031	+75 20 11.11	4.309	+0.051
$\alpha$ Draconis . . . . .	4.8	K0	18 49 58.730	+0.8880	+0.0116	+59 17 11.75	4.360	+0.023
$\sigma$ Sagittarii . . . . .	2.1	B3	18 50 7.114	3.7200	-.0003	-26 24 3.66	4.274	-0.075
$\theta$ Serpentis <i>pr.</i> . . . . .	4.5	A5	18 52 5.582	2.9822	+0.0027	+ 4 5 40.76	4.545	+0.028
R Lyrae . . . . .	var.	Mb	18 52 48.588	+1.8260	+0.0026	+43 50 10.20	+4.656	+0.078
$\gamma$ Lyrae . . . . .	3.3	A0	18 55 50.298	2.2435	-.0006	+32 34 29.74	4.830	-0.006
$\epsilon$ Aquilæ . . . . .	4.2	K0	18 55 51.301	2.7221	-.0042	+14 57 16.73	4.756	-0.081
$\zeta$ Sagittarii . . . . .	2.7	A2	18 57 19.884	3.8178	-.0024	-30 0 0.26	4.943	-0.019
$\zeta$ Aquilæ . . . . .	3.0	A0	19 1 35.698	2.7569	-.0008	+13 44 21.13	5.224	-0.099
$\lambda$ Aquilæ . . . . .	3.6	A0	19 1 50.651	+3.1835	-.0020	- 5 0 28.20	+5.261	-0.083
$\alpha$ Coronæ Australis . . . . .	4.1	A2	19 3 49.557	4.0829	+0.0051	-38 2 6.34	5.393	-0.118
$\iota$ Lyrae . . . . .	5.1	B5	19 4 20.420	2.1413	+0.0005	+35 58 9.57	5.548	-0.006
$\pi$ Sagittarii . . . . .	3.0	F2	19 4 49.713	3.5688	-.0005	-21 9 23.62	5.559	-0.036
$\psi$ Sagittarii . . . . .	4.9	F5	19 10 27.129	3.6800	+0.0025	-25 24 2.96	6.030	-0.035
$\delta$ Draconis . . . . .	3.2	K0	19 12 32.414	+0.0218	+0.0175	+67 30 55.85	+6.327	+0.088
$\delta$ Sagittarii . . . . .	5.0	K0	19 12 46.758	+3.5108	-.0015	-19 6 5.88	+6.243	-0.017

$\phi$  Draconis, star 6=1, 30".4 n. l.  
 $\eta$  Ophiuchi, comp. 6=, 2".1 s.

$\beta$  Lyrae, var., 12<sup>d</sup>.9, 3=4-4=1, star  
 7=, 46" s. l.  
 $\alpha$  Draco, star 7=6, 32".1 n. pr.

$\theta$  Serpentis, star 5=4, 22".2 s. l.  
 R Lyrae, var., 40<sup>d</sup>.4, 4=0-4=7.  
 $\zeta$  Sag., binary, 3=4, 3=6, 0".5.

# 228 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	° ' "	"	"
θ Lyrae . . . . .	4.5	K0	19 13 29.188	+2.0808	-.0015	+37 59 7.19	+ 6.324	+0.006
ω Aquilæ . . . . .	5.1	A5	19 13 55.236	2.8158	-.0002	+11 26 41.49	6.368	+0.014
κ Cygni . . . . .	4.0	K0	19 15 11.130	+1.3878	+0.0071	+53 12 53.51	6.580	+0.121
τ Draconis . . . . .	4.6	K0	19 17 9.537	-1.1368	-.0312	+73 12 6.36	6.731	+0.109
δ Aquilæ . . . . .	3.4	F0	19 21 18.819	+3.0249	+0.0168	+ 2 56 54.21	7.045	+0.081
β Cygni . . . . .	3.2	K0p	19 27 22.426	+2.4189	-.0002	+27 47 4.40	+ 7.448	-0.010
ι Cygni . . . . .	3.9	A2	19 27 36.836	1.5132	+0.0023	+51 33 8.92	7.606	+0.129
μ Aquilæ . . . . .	4.6	K0	19 30 2.113	2.9312	+0.0145	+ 7 12 7.10	7.528	-0.146
h Sagittarii . . . . .	4.7	B9	19 31 39.459	3.6528	+0.0045	-25 4 4.19	7.778	-0.027
κ Aquilæ . . . . .	5.0	B0	19 32 25.638	3.2287	+0.0005	- 7 12 46.14	7.869	+0.002
θ Cygni . . . . .	4.6	F5	19 34 12.963	+1.6089	-.0024	+50 1 42.06	+ 8.261	+0.250
54 Sagittarii . . . . .	5.4	K0	19 35 58.167	3.4386	+0.0046	-16 29 4.31	8.104	-0.047
β Sagittæ . . . . .	4.4	K0	19 37 19.243	2.6939	+0.0001	+17 16 58.67	8.227	-0.032
15 Cygni . . . . .	5.0	K0	19 41 17.033	2.1640	+0.0068	+37 9 12.00	8.614	+0.040
f Sagittarii . . . . .	5.1	K0	19 41 31.295	3.5013	-.0099	-19 57 41.56	8.504	-0.088
γ Aquilæ . . . . .	2.8	K2	19 42 18.817	+2.8519	+0.0007	+10 24 36.48	+ 8.651	-0.003
δ Cygni . . . . .	3.0	A0	19 42 22.897	1.8760	+0.0055	+44 55 39.24	8.704	+0.044
δ Sagittæ . . . . .	3.8	Map	19 43 41.215	2.6749	+0.0004	+18 19 43.62	8.780	+0.017
α Aquilæ ( <i>Altair</i> ) . . . . .	0.9	A5	19 46 44.024	2.9271	+0.0360	+ 8 38 53.59	9.380	+0.379
η Aquilæ . . . . .	var.	G0	19 48 14.719	+3.0567	+0.0005	+ 0 47 30.35	9.111	-0.008
ε Draconis . . . . .	4.0	K0	19 48 27.750	-0.1885	+0.0170	+70 3 23.40	+ 9.164	+0.027
ι Sagittarii . . . . .	4.2	K0	19 49 32.212	+4.1427	-.0017	-42 5 14.69	9.265	+0.045
ε Pavonis . . . . .	4.1	A0	19 51 0.707	6.9839	+0.0112	-73 7 51.67	9.215	-0.120
β Aquilæ . . . . .	3.9	K0	19 51 14.175	2.9468	+0.0025	+ 6 11 55.08	8.871	-0.481
γ Sagittæ . . . . .	3.7	K5	19 55 3.931	2.6673	+0.0041	+19 15 57.45	9.672	+0.025
ε Sagittarii . . . . .	4.6	Mb	19 57 33.406	+3.6926	+0.0023	-27 56 29.64	+ 9.851	+0.013
τ Aquilæ . . . . .	5.6	K0	20 0 5.136	2.9307	+0.0010	+ 7 2 35.37	10.059	+0.029
θ Aquilæ . . . . .	3.4	A0	20 7 1.371	3.0959	+0.0020	- 1 4 6.48	10.555	+0.006
ο Cygni seq. . . . .	4.0	K0p	20 11 1.132	+1.8901	+0.0014	+46 29 20.71	10.851	+0.005
κ Cephei . . . . .	4.4	B9	20 11 42.531	-1.9687	+0.0025	+77 27 43.18	10.922	+0.026
24 Vulpeculæ . . . . .	5.4	K0	20 13 14.008	+2.5674	+0.0017	+24 24 53.00	+10.996	-0.012
α <sup>2</sup> Capricorni . . . . .	3.8	K0	20 13 27.046	3.3303	+0.0040	-12 48 10.54	11.032	+0.008
β Capricorni . . . . .	3.2	G0p	20 16 21.000	3.3732	+0.0030	-15 2 39.49	11.241	+0.007
α Pavonis . . . . .	2.1	B3	20 19 5.338	4.7631	-.0000	-57 0 7.87	11.340	-0.092
γ Cygni . . . . .	2.3	F8p	20 19 14.948	2.1527	+0.0004	+39 59 25.47	11.444	+0.001
π Capricorni . . . . .	5.2	B8	20 22 34.314	+3.4361	+0.0004	-18 29 4.29	+11.679	-0.002
ρ Capricorni . . . . .	5.0	F0	20 24 7.690	3.4244	-.0013	-18 5 20.02	11.771	-0.020
41 Cygni . . . . .	4.1	F5	20 26 0.298	2.4516	+0.0014	+30 5 27.48	11.922	-0.002
θ Cephei . . . . .	4.3	A5	20 28 11.516	1.0114	+0.0066	+62 42 53.24	12.059	-0.018
ε Delphini . . . . .	4.0	B5	20 29 14.877	+2.8664	+0.0007	+11 1 13.40	12.126	-0.025
Groombridge 3241 . . . . .	6.4	K2	20 30 22.523	-0.2401	-.0047	+72 15 2.00	+12.210	-0.018
α Indi . . . . .	3.2	K0	20 31 43.960	+4.2290	+0.0027	-47 34 55.24	12.376	+0.053
β Delphini . . . . .	3.7	F5	20 33 39.453	2.8138	+0.0082	+14 18 20.44	12.420	-0.035
ν Capricorni . . . . .	5.3	Ma	20 35 19.605	3.4178	-.0018	-18 25 53.45	12.562	-0.007
α Delphini . . . . .	3.9	B8	20 35 46.988	2.7868	+0.0047	+15 37 7.61	12.617	+0.017
β Pavonis . . . . .	3.6	A5	20 37 29.681	+5.4409	-.0079	-66 30 9.90	+12.713	-0.003
α Cygni ( <i>Deneb</i> ) . . . . .	1.3	A2p	20 38 36.119	2.0448	+0.0004	+44 58 59.39	12.789	-0.002
δ Delphini . . . . .	4.5	A2	20 39 35.044	2.8008	-.0014	+14 46 33.59	12.807	-0.050
ψ Capricorni . . . . .	4.3	F8	20 41 11.051	3.5563	-.0041	-25 34 11.19	12.816	-0.148
γ Delphini seq. . . . .	4.5	G5	20 42 48.447	2.7832	-.0023	+15 49 28.19	12.876	-0.196
ε Cygni . . . . .	2.6	K0	20 42 51.169	+2.4275	+0.0294	+33 39 31.48	+13.401	+0.326
ε Aquarii . . . . .	3.8	A0	20 43 13.054	3.2491	+0.0017	- 9 48 1.17	13.067	-0.030
η Cephei . . . . .	3.6	K0	20 43 36.226	1.2243	+0.0132	+61 30 58.03	13.945	+0.820
μ Aquarii . . . . .	4.8	A3	20 48 10.706	3.2376	+0.0025	- 9 17 44.18	13.396	-0.039
β Indi . . . . .	3.7	K0	20 48 19.977	4.7101	+0.0018	-58 46 4.98	13.426	-0.008
32 Vulpeculæ . . . . .	5.2	K2	20 51 1.338	+2.5563	-.0003	+27 44 28.91	+13.613	+0.004

β Cygni, star 5=4, 34".7 n. f.  
 δ Cygni, comp. 8=, 1".6 n. pr.  
 γ Aquilæ, var., 7<sup>d</sup>.18, 8=, 7-4=4  
 ε Draconis, comp. 7=8, 3".1 n.

ο Cygni, star 5=0 pr. 19=, 270" n.,  
 star 7=8 f. 1=, 96" s.  
 κ Cephei, comp. 8=, 7".5 s. f.  
 α<sup>2</sup> Capricorn., α<sup>1</sup> Capricorn. 4=6 pr. 24=,  
 137" n.

β Capricorn., star 6=2 pr. 14=, 10" s.  
 ν Capricorn., comp. 9=, 3".4 s. f.  
 ρ Capricorn., comp. 7=6, 2".8 s.  
 β Delphini, binary 4=1, 5=4, 0".5  
 γ Delphini, comp. 6=5, 11".2 pr.

# MEAN PLACES OF TEN-DAY STARS, 1917. 229

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	" ' "	"	"
220 H <sup>1</sup> . Draconis	5.6	K0	20 51 23.721	-2.6348	-.0105	+80 14 30.34	+13.607	-0.025
γ Cygni	4.0	A0	20 54 4.689	+2.2356	+0.0008	+40 50 49.17	13.786	-0.018
α Octantis	5.2	F2	20 54 42.416	7.3755	-.0007	-77 20 31.45	13.454	-0.389
γ Microscopii	4.7	G5	20 56 12.259	3.6861	-.0004	-32 34 58.56	13.933	-0.004
θ Capricorni	4.2	A0	21 1 17.001	3.3751	+0.0051	-17 33 48.54	14.187	-0.066
ξ Cygni	3.9	K5	21 1 54.674	+2.1814	+0.0009	+43 35 46.67	+14.300	+0.008
61 Cygni pr.	5.6	K5	21 3 10.466	2.6853	+0.3496	+38 20 26.13	17.618	+3.249
61 Cygni seq.	6.3	K5	Δα + 1.499	.....	.....	Δδ -15.64	.....	.....
ν Aquarii	4.5	K0	21 5 4.447	+3.2698	+0.0057	-11 42 30.02	14.479	-0.006
Bradley 2777	5.9	A	21 7 11.200	-1.1450	+0.0102	+77 47 24.11	14.641	+0.029
3 Piscis Australis	5.6	K5	21 8 22.207	+3.5630	+0.0075	-27 57 30.84	+14.576	-0.106
ζ Cygni	3.4	K0	21 9 24.176	2.5522	-.0002	+29 53 9.03	14.683	-0.061
τ Cygni	3.8	F0	21 11 28.636	2.3941	+0.0141	+37 41 26.11	15.300	+0.434
α Equulei	4.1	F8p	21 11 40.506	2.9992	+0.0034	+ 4 54 14.60	14.792	-0.085
σ Cygni	4.3	A0p	21 14 9.301	2.3549	-.0001	+39 2 47.12	15.025	+0.003
θ <sup>1</sup> Microscopii	4.9	A2p	21 15 27.288	+3.8440	+0.0028	-41 9 40.04	+15.102	+0.005
α Cephei	2.6	A5	21 16 36.023	1.4348	+0.0224	+62 14 0.93	15.212	+0.050
ι Capricorni	4.3	K0	21 17 37.651	3.3438	+0.0022	-17 11 19.32	15.225	+0.004
l Pegasi	4.2	K0	21 18 14.864	2.7741	+0.0075	+19 26 55.70	15.321	+0.064
γ Pavonis	4.3	F8	21 19 35.870	4.9983	+0.0154	-65 44 34.26	16.117	+0.784
ζ Capricorni	3.9	G5p	21 21 55.893	+3.4300	+0.0004	-22 46 17.40	+15.484	+0.020
g Cygni	5.3	K0	21 26 23.141	2.2128	+0.0050	+46 10 27.13	15.814	+0.105
β Aquarii	3.1	G0	21 27 11.442	3.1598	+0.0012	- 5 56 13.11	15.742	-0.011
β Cephei	3.3	B1	21 27 35.732	0.7853	+0.0026	+70 11 46.22	15.780	+0.005
ξ Aquarii	4.8	A5	21 33 20.090	3.1955	+0.0075	- 8 13 37.29	16.056	-0.023
74 Cygni	5.1	A5	21 33 37.291	+2.4035	+0.0003	+40 2 24.51	+16.103	+0.009
γ Capricorni	3.8	F0p	21 35 29.676	3.3270	+0.0129	-17 2 15.90	16.174	-0.017
ε Pegasi	2.5	K0	21 40 6.553	2.9461	+0.0016	+ 9 29 37.98	16.425	0.000
11 Cephei	4.8	K0	21 40 42.615	0.8874	+0.0221	+70 55 44.50	16.549	+0.093
δ Capricorni	3.0	A5	21 42 27.698	3.3139	+0.0176	-16 30 16.26	16.246	-0.297
π <sup>2</sup> Cygni	4.3	B3	21 43 43.539	+2.2147	+0.0009	+48 55 30.44	+16.604	-0.001
μ Capricorni	5.2	F0	21 48 46.341	3.2728	+0.0204	-13 56 35.42	16.849	+0.001
γ Gruis	3.2	B8	21 48 54.415	3.6406	+0.0077	-37 45 21.18	16.834	-0.021
16 Pegasi	5.0	B3	21 49 17.082	2.7285	+0.0005	+25 32 3.21	16.878	+0.006
79 Draconis	6.6	A0	21 51 49.247	0.7179	+0.0100	+73 18 33.99	17.007	+0.016
ε Indi	4.7	K5	21 57 1.104	+4.6081	+0.4783	-57 7 39.60	+14.655	-2.573
20 Pegasi	5.7	F2	21 57 2.716	2.9222	+0.0038	+12 43 18.54	17.176	-0.054
α Aquarii	3.2	G0	22 1 31.295	3.0820	+0.0010	- 0 43 24.62	17.424	-0.002
ι Aquarii	4.4	B8	22 1 57.362	3.2423	+0.0022	-14 16 22.40	17.383	-0.063
20 Cephei	5.4	K5	22 2 29.121	1.8229	+0.0032	+62 22 49.19	17.519	+0.051
α Gruis	2.2	B5	22 3 0.476	+3.7928	+0.0110	-47 21 49.43	+17.315	-0.174
ι Pegasi	4.0	F5	22 3 8.777	2.7916	+0.0222	+24 56 21.20	17.516	+0.020
θ Pegasi	3.7	A0	22 6 0.805	3.0267	+0.0187	+ 5 47 20.84	17.652	+0.036
π Pegasi	4.4	F5	22 6 17.996	2.6628	-.0003	+32 46 13.86	17.610	-0.018
ζ Cephei	3.6	K0	22 7 58.365	2.0783	+0.0018	+57 47 30.65	17.708	+0.010
24 Cephei	5.0	G5	22 8 12.885	+1.1573	+0.0044	+71 55 55.62	+17.711	+0.004
θ Aquarii	4.3	K0	22 12 27.295	3.1671	+0.0074	- 8 11 49.13	17.860	-0.019
α Tucanæ	2.9	K2	22 12 49.495	4.1332	-.0118	-60 40 25.05	17.859	-0.035
γ Aquarii	4.0	A0	22 17 22.185	3.0990	+0.0081	- 1 48 21.22	18.084	+0.015
31 Pegasi	4.9	B3p	22 17 25.960	2.9530	+0.0010	+11 47 11.51	18.078	+0.007
3 Lacertæ	4.6	K0	22 20 17.636	+2.3559	-.0007	+51 48 46.37	+17.990	-0.188
π Aquarii	4.6	B1	22 21 2.291	3.0637	+0.0004	+ 0 57 20.70	18.204	-0.001
σ Aquarii	4.9	A0	22 26 15.390	3.1769	.0000	-11 6 10.87	18.366	-0.026
α Lacertæ	3.8	A0	22 27 52.200	2.4684	+0.0157	+49 51 19.43	18.461	+0.014
ν Aquarii	5.3	F5	22 30 9.299	3.2848	+0.0148	-21 8 2.09	18.370	-0.154
226 B. Cephei	5.7	A0	22 30 49.232	+1.0641	-.0052	+75 47 55.01	+18.547	0.000

γ Cygni, comp. 7<sup>m</sup>, 0<sup>s</sup>.8

g Cygni, star 6<sup>m</sup>.7 f. 10<sup>s</sup>, 420<sup>s</sup>. a.

β Cephei, star 8<sup>m</sup>, 13<sup>s</sup>.3 a. pr.

# 230 MEAN PLACES OF TEN-DAY STARS, 1917.

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.			Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s			" " "	" "	" "
$\eta$ Aquarii	4.1	B8	22 31 5.504	+3.0831	+0.0057	- 0 32 44.30	+18.503	-0.053		
10 Lacertæ	4.9	Oe5	22 35 32.103	2.6892	+0.0011	+38 37 4.45	18.688	-0.011		
$\varepsilon$ Piscis Australis	4.2	B8	22 36 4.046	3.3223	+0.0008	-27 28 37.50	18.705	-0.011		
$\zeta$ Pegasi	3.6	B8	22 37 19.326	2.9915	+0.0054	+10 23 51.67	18.741	-0.014		
$\beta$ Gruis	2.2	Mb	22 37 43.040	3.5951	+0.0133	-47 19 8.97	18.741	-0.026		
$\eta$ Pegasi	3.1	G0	22 39 6.566	+2.8094	+0.0011	+29 47 12.05	+18.772	-0.037		
$\lambda$ Pegasi	4.1	K0	22 42 31.883	2.8871	+0.0037	+23 7 42.77	18.902	-0.009		
$\varepsilon$ Gruis	3.7	A2	22 43 32.835	3.6871	+0.0093	-51 45 12.77	18.882	-0.059		
$\tau$ Aquarii	4.2	K5	22 45 11.957	3.1789	-0.0008	-14 1 51.42	18.954	-0.033		
$\mu$ Pegasi	3.7	K0	22 45 59.749	2.8934	+0.0110	+24 9 46.83	18.968	-0.042		
$\iota$ Cephei	3.7	K0	22 46 43.309	+2.1285	-0.0111	+65 45 48.98	+18.903	-0.126		
$\lambda$ Aquarii	3.8	Ma	22 48 17.113	3.1308	+0.0002	- 8 1 17.70	19.107	+0.035		
$\rho$ Indi	6.1	G5	22 48 53.950	4.2126	-0.0133	-70 31 3.03	19.142	+0.053		
$\delta$ Aquarii	3.5	A2	22 50 14.807	3.1861	-0.0034	-16 15 45.11	19.098	-0.026		
$\alpha$ Pisc. Aust. ( <i>Fomalhaut</i> )	1.3	A3	22 53 4.049	3.3205	+0.0252	-30 3 44.98	19.025	-0.171		
$\alpha$ Andromedæ	3.6	B5p	22 58 5.916	+2.7549	+0.0020	+41 52 46.70	+19.309	-0.010		
$\beta$ Pegasi	var.	Ma	22 59 44.908	2.9054	+0.0146	+27 37 56.23	19.492	+0.135		
$\alpha$ Pegasi ( <i>Markab</i> )	2.6	A0	23 0 37.503	2.9865	+0.0040	+14 45 30.41	19.337	-0.039		
55 Pegasi	4.7	Ma	23 2 49.342	3.0209	+0.0003	+ 8 57 38.97	19.413	-0.012		
$\epsilon^2$ Aquarii	3.8	K0	23 5 1.376	3.2017	+0.0032	-21 37 23.65	19.512	+0.041		
$\pi$ Cephei	4.6	G5	23 5 15.234	+1.8999	+0.0023	+74 56 19.07	+19.444	-0.032		
$\iota$ Gruis	4.1	K0	23 5 39.922	3.4064	+0.0121	-45 41 47.69	19.454	-0.031		
59 Pegasi	5.2	A3	23 7 32.720	3.0279	-0.0007	+ 8 16 9.18	19.527	+0.004		
5 H <sup>1</sup> . Cassiopeiæ	5.6	K2	23 9 16.897	2.8795	+0.2536	+56 42 35.99	19.855	+0.299		
$\phi$ Aquarii	4.4	Ma	23 10 1.450	3.1071	+0.0015	- 6 29 48.06	19.376	-0.194		
$\psi$ Aquarii	4.5	K0	23 11 32.666	+3.1447	+0.0250	- 9 32 23.99	+19.594	-0.005		
$\gamma$ Tucanæ	4.1	F2	23 12 35.551	3.5182	-0.0057	-58 41 28.76	19.678	+0.060		
$\gamma$ Piscium	3.8	K0	23 12 51.731	3.1094	+0.0502	+ 2 49 42.94	19.643	+0.021		
$\gamma$ Sculptoris	4.5	K0	23 14 20.684	3.2444	+0.0002	-32 59 3.88	19.583	-0.066		
$\alpha$ Cephei	4.9	G5	23 15 12.670	2.4526	+0.0113	+67 39 26.07	19.682	+0.018		
$\tau$ Pegasi	4.6	A5	23 16 31.586	+2.9660	+0.0018	+23 17 8.86	+19.674	-0.012		
$\delta^1$ Aquarii	4.2	K0	23 18 36.761	3.1528	-0.0099	-20 33 14.07	19.630	-0.089		
4 Cassiopeiæ	5.2	K5	23 21 8.592	2.6512	-0.0004	+61 49 37.20	19.748	-0.010		
$v$ Pegasi	4.6	G0	23 21 14.067	2.9908	+0.0134	+22 56 48.93	19.790	+0.030		
$\kappa$ Piscium	4.9	A2p	23 22 40.659	3.0752	+0.0056	+ 0 48 4.07	19.688	-0.093		
$\theta$ Piscium	4.4	G5	23 23 45.418	+3.0421	-0.0088	+ 5 55 22.75	+19.754	-0.041		
70 Pegasi	4.7	K0	23 24 57.338	3.0322	+0.0040	+12 18 9.10	19.847	+0.035		
$\beta$ Sculptoris	4.5	B9	23 28 31.456	3.2242	+0.0071	-38 16 39.40	19.862	+0.006		
72 Pegasi ( <i>mean</i> )	5.2	K2	23 29 49.929	2.9713	+0.0035	+30 52 1.86	19.862	-0.009		
$\lambda$ Andromedæ	4.0	K0	23 33 29.829	2.9287	+0.0158	+46 0 30.22	19.492	-0.420		
$\iota$ Andromedæ	4.3	B8	23 34 3.667	+2.9353	+0.0025	+42 48 30.57	+19.917	0.000		
$\iota$ Piscium	4.3	G0	23 35 40.825	3.0845	+0.0246	+ 5 10 34.77	19.497	-0.436		
$\gamma$ Cephei	3.4	K0	23 35 55.858	2.4403	-0.0173	+77 10 8.83	20.092	+0.157		
$\kappa$ Andromedæ	4.3	A0	23 36 18.934	2.9479	+0.0078	+43 52 27.14	19.914	-0.024		
$\omega^2$ Aquarii	4.6	A0	23 38 25.143	3.1126	+0.0063	-15 0 13.76	19.894	-0.063		
$i^1$ Aquarii	5.3	B8	23 39 53.896	+3.1143	+0.0019	-18 44 15.92	+19.963	-0.006		
$\psi$ Andromedæ	5.1	K0	23 41 54.967	2.9643	+0.0005	+45 57 33.59	19.975	-0.008		
41 H. Cephei	5.0	A0	23 43 55.971	2.8507	+0.0024	+67 20 43.89	19.986	-0.010		
$\delta$ Sculptoris	4.6	A0	23 44 36.240	3.1274	+0.0059	-28 35 22.88	19.867	-0.133		
$\phi$ Pegasi	5.2	Ma	23 48 15.780	3.0482	-0.0013	+18 39 33.40	19.980	-0.039		
$\rho$ Cassiopeiæ	4.8	F8p	23 50 13.711	+2.9826	-0.0022	+57 2 15.48	+20.029	+0.002		
Groombridge 4163	6.6	B9	23 50 46.464	2.8818	-0.0040	+73 56 54.22	20.025	-0.005		
$\omega$ Piscium	4.0	F5	23 55 2.897	3.0796	+0.0102	+ 6 24 13.92	19.933	-0.108		
$\varepsilon$ Tucanæ	4.7	B9	23 55 36.742	3.1378	+0.0076	-66 2 19.02	20.034	-0.007		
30 Piscium	4.7	Mb	23 57 42.213	3.0771	+0.0030	- 6 28 31.21	20.007	-0.037		
2 Ceti	4.6	A0	23 59 29.339	+3.0751	+0.0015	-17 47 53.22	+20.032	-0.013		

$\beta$  Pegasi, var. irreg., 2<sup>m</sup>.2-2<sup>m</sup>.7  
 $\omega$  Cephei, comp. 7<sup>m</sup>, 0<sup>m</sup>.9 f.

$\psi$  Aquarii, star 8<sup>m</sup>.5, 49<sup>m</sup>.4 n. pr.  
 $\alpha$  Cephei, comp. 8<sup>m</sup>, 2<sup>m</sup>.9 s. pr.

72 Pegasi, binary, 6<sup>m</sup>.0, 6<sup>m</sup>.0, 0<sup>m</sup>.4.

# MEAN PLACES OF CIRCUMPOLAR STARS, 1917. 231

FOR JANUARY 0<sup>d</sup>.217, WASHINGTON MEAN TIME.

Name of Star.	Magni- tude.	Spec- trum.	Right Ascension.	Annual Vari- ation.	Annual P. M.	Declination.	Annual Vari- ation.	Annual P. M.
			h m s	s	s	" ' "	" "	" "
43 H. Cephei . . . . .	4.5	K0	0 57 9.300	+ 7.6306	+ .0730	+85 48 45.30	+19.421	-0.004
$\alpha$ Ursæ Min. ( <i>Polaris</i> ) . . . . .	2.1	F8	1 30 13.156	+29.0262	+ .1472	+88 51 43.55	+18.514	+0.002
4 G. Octantis . . . . .	5.6	K0	1 42 2.339	- 3.7571	+ .0086	-85 11 21.46	+18.119	+0.028
Groombridge 750 . . . . .	6.7	F8	4 10 2.561	+17.6173	+ .0128	+85 20 10.34	+ 9.295	+0.042
Groombridge 944 . . . . .	6.4	K0	5 35 12.782	+18.7703	+ .0130	+85 9 30.24	+ 2.160	-0.004
31 G. Mensæ . . . . .	6.2	A0	5 46 14.756	-11.6820	- .0123	-84 49 46.89	+ 1.289	+0.087
$\zeta$ Mensæ . . . . .	5.6	A2	6 46 58.546	- 4.9448	- .0036	-80 43 38.16	- 3.998	+0.082
51 H. Cephei . . . . .	5.3	Ma	7 2 4.048	+29.1731	- .0578	+87 10 54.74	- 5.397	-0.035
25 H. Camelopardalis . . . . .	5.1	Mb	7 13 42.294	+12.8146	+ .0132	+82 34 30.13	- 6.383	-0.047
7 G. Octantis . . . . .	6.4	F5	7 16 20.292	-20.2749	- .0146	-86 54 6.70	- 6.548	+0.005
Groombridge 1119 . . . . .	7.0	A0	8 15 48.380	+59.9071	- .0404	+88 53 0.29	-11.178	+0.017
$\zeta$ Octantis . . . . .	5.4	A3	9 8 57.938	- 8.1549	- .1147	-85 19 57.45	-14.675	+0.043
1 H. Draconis . . . . .	4.6	K0	9 25 21.719	+ 8.7856	- .0059	+81 41 41.50	-15.680	-0.027
$\zeta$ Chamæleontis . . . . .	5.2	B3	9 36 22.347	- 1.6575	- .0121	-80 34 6.83	-16.217	+0.019
30 H. Camelopardalis . . . . .	5.3	F5	10 21 4.831	+ 7.5676	- .0462	+82 58 54.07	-18.198	+0.009
$\eta$ Octantis . . . . .	6.3	A0	10 59 55.280	- 0.3633	- .0574	-84 8 50.60	-19.365	-0.005
Bradley 1672 . . . . .	6.3	F0	12 14 28.425	+ 0.3756	- .0716	+88 9 36.08	-19.947	+0.058
$\pi$ Octantis . . . . .	5.4	K0	12 46 7.152	+ 5.9739	+ .0366	-84 40 22.34	-19.617	+0.024
32 H. Camelop. seq. . . . .	5.3	A2	12 48 30.418	+ 0.4429	- .0184	+83 51 50.47	-19.582	+0.016
$\kappa$ Octantis . . . . .	5.6	A2	13 27 14.624	+ 9.1162	- .0764	-85 21 42.23	-18.634	-0.024
$\delta$ Octantis . . . . .	4.1	K2	14 13 27.793	+ 9.2680	- .0511	-83 17 21.03	-16.756	-0.014
Groombridge 2283 . . . . .	7.2	K0	15 3 41.175	-19.3982	- .0066	+87 33 10.52	-13.914	+0.031
$\rho$ Octantis . . . . .	5.7	A2	15 23 56.594	+13.3645	+ .0842	-84 11 30.39	-12.539	+0.080
$\epsilon$ Ursæ Minoris . . . . .	4.4	G5	16 54 25.488	- 6.2513	+ .0057	+82 10 32.75	- 5.658	-0.001
59 G. Apodis . . . . .	5.9	Mb	17 15 54.896	+11.1869	+ .0086	-80 47 6.56	- 3.871	-0.039
$\delta$ Ursæ Minoris . . . . .	4.4	A0	17 59 1.307	-19.4978	+ .0175	+86 36 51.17	- 0.038	+0.048
$\chi$ Octantis . . . . .	5.2	K0	18 6 11.893	+35.7286	- .0967	-87 39 51.82	+ 0.416	-0.127
$\lambda$ Ursæ Minoris . . . . .	6.6	Mb	19 2 39.624	-72.0496	- .1103	+89 1 2.17	+ 5.418	+0.006
$\sigma$ Octantis . . . . .	5.5	F0	19 27 42.218	+94.7793	+ .1084	-89 13 28.57	+ 7.485	-0.001
76 Draconis . . . . .	5.7	A0	20 48 40.494	- 4.1683	+ .0131	+82 13 29.86	+13.482	+0.025
$\lambda$ Octantis . . . . .	5.4	G0p	21 38 19.542	+ 9.5134	+ .0389	-83 6 6.99	+16.323	-0.012
$\nu$ Octantis . . . . .	5.7	K0	22 16 8.656	+12.3084	- .0400	-86 23 27.13	+18.097	+0.074
$\beta$ Octantis . . . . .	4.3	F0	22 37 39.016	+ 6.3104	- .0302	-81 49 2.34	+18.767	+0.002
39 H. Cephei . . . . .	5.6	F0	23 27 44.125	- 0.2705	+ .0639	+86 50 58.89	+19.867	+0.020
$\gamma^1$ Octantis . . . . .	5.1	G5	23 47 16.424	+ 3.6100	- .0247	-82 28 48.42	+20.003	-0.012

$\alpha$  Ursæ Min., star 9<sup>m</sup>, 18'' s. pr. | 32 H. Camelop., star 5<sup>m</sup>, 19'' s. pr. |  $\lambda$  Octantis, binary, 5<sup>m</sup>-5, 8<sup>m</sup>-0, 3'' s. p.

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m    ° ' "		Jan.	h m    ° ' "		Jan.	h m    ° ' "		Jan.	h m    ° ' "		Jan.	h m    ° ' "	
	0 57    +85 49			1 29    +88 52			1 41    -85 11			4 10    +85 20			5 35    +85    9	
	s        "        "			s        "        "			s        "        "			s        "        "			s        "        "	
0.3	10.94    12.49	0.3	89.73    10.50	0.3	67.69    34.01	0.4	20.66    27.91	0.5	34.20    39.06					
1.3	10.68    12.55	1.3	88.81    10.59	1.3	67.40    34.06	1.4	20.55    28.15	1.5	34.17    39.33					
2.3	10.44    12.60	2.3	87.93    10.69	2.3	67.09    34.11	2.4	20.45    28.38	2.4	34.16    39.61					
3.3	10.21    12.66	3.3	87.07    10.80	3.3	66.77    34.16	3.4	20.36    28.62	3.4	34.15    39.88					
4.3	9.97    12.75	4.3	86.20    10.92	4.3	66.49    34.15	4.4	20.27    28.88	4.4	34.15    40.16					
5.3	9.71    12.81	5.3	85.28    11.03	5.3	66.19    34.12	5.4	20.17    29.15	5.4	34.15    40.45					
6.2	9.44    12.88	6.3	84.28    11.16	6.3	65.91    34.08	6.4	20.07    29.44	6.4	34.15    40.77					
7.2	9.16    12.95	7.3	83.23    11.29	7.3	65.63    34.03	7.4	19.95    29.74	7.4	34.12    41.10					
8.2	8.85    13.01	8.3	82.12    11.40	8.3	65.38    33.99	8.4	19.81    30.03	8.4	34.08    41.44					
9.2	8.53    13.06	9.3	80.97    11.51	9.3	65.13    33.94	9.4	19.66    30.31	9.4	34.03    41.78					
10.2	8.20    13.08	10.3	79.80    11.57	10.3	64.88    33.91	10.4	19.49    30.59	10.4	33.97    42.11					
11.2	7.90    13.09	11.3	78.62    11.63	11.3	64.63    33.88	11.4	19.31    30.84	11.4	33.88    42.43					
12.2	7.59    13.06	12.3	77.45    11.68	12.3	64.37    33.85	12.4	19.12    31.08	12.4	33.78    42.74					
13.2	7.28    13.02	13.2	76.31    11.69	13.3	64.11    33.84	13.4	18.92    31.29	13.4	33.67    43.04					
14.2	6.99    12.97	14.2	75.22    11.70	14.3	63.83    33.84	14.4	18.73    31.49	14.4	33.56    43.31					
15.2	6.72    12.92	15.2	74.19    11.69	15.3	63.54    33.83	15.4	18.54    31.68	15.4	33.45    43.56					
16.2	6.47    12.88	16.2	73.22    11.69	16.2	63.25    33.79	16.4	18.38    31.86	16.4	33.36    43.80					
17.2	6.23    12.85	17.2	72.29    11.70	17.2	62.93    33.72	17.3	18.23    32.03	17.4	33.27    44.04					
18.2	5.99    12.83	18.2	71.39    11.73	18.2	62.63    33.64	18.3	18.08    32.21	18.4	33.20    44.27					
19.2	5.75    12.83	19.2	70.46    11.78	19.2	62.32    33.53	19.3	17.94    32.43	19.4	33.14    44.53					
20.2	5.49    12.82	20.2	69.49    11.83	20.2	62.03    33.38	20.3	17.80    32.65	20.4	33.09    44.80					
21.2	5.22    12.83	21.2	68.44    11.89	21.2	61.76    33.23	21.3	17.63    32.88	21.4	33.01    45.09					
22.2	4.94    12.81	22.2	67.31    11.94	22.2	61.52    33.09	22.3	17.46    33.11	22.4	32.93    45.40					
23.2	4.61    12.77	23.2	66.12    11.96	23.2	61.27    32.94	23.3	17.27    33.35	23.4	32.83    45.72					
24.2	4.29    12.72	24.2	64.91    11.94	24.2	61.03    32.81	24.3	17.04    33.56	24.4	32.69    46.03					
25.2	3.97    12.62	25.2	63.71    11.90	25.2	60.80    32.69	25.3	16.81    33.75	25.4	32.54    46.31					
26.2	3.68    12.50	26.2	62.55    11.84	26.2	60.54    32.59	26.3	16.57    33.91	26.4	32.36    46.55					
27.2	3.40    12.36	27.2	61.47    11.75	27.2	60.27    32.50	27.3	16.33    34.05	27.4	32.18    46.79					
28.2	3.15    12.23	28.2	60.46    11.67	28.2	59.99    32.39	28.3	16.10    34.16	28.4	32.03    46.98					
29.2	2.91    12.10	29.2	59.52    11.58	29.2	59.69    32.26	29.3	15.89    34.27	29.4	31.88    47.17					
30.2	2.69    11.99	30.2	58.64    11.53	30.2	59.40    32.14	30.3	15.70    34.38	30.4	31.73    47.37					
31.2	2.48    11.89	31.2	57.76    11.47	31.2	59.10    32.00	31.3	15.51    34.50	31.4	31.60    47.57					
13.72	+13.68		50.70	+50.69		11.93	-11.89		12.31	+12.27		11.86	+11.82	
0° 57' = 9° 30'			1° 30' = 13° 15'			1° 42' = 2° 33'			4° 10' = 2° 56'			5° 35' = 12° 78'		
+85° 48' 45" = 30			+88° 51' 43" = 55			-85° 11' 21" = 46			+85° 20' 10" = 34			+85° 9' 30" = 24		



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Menesse. Mag. 6.2			ζ Menesse. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "
Jan.	5 46	-84 49	Jan.	6 47	-80 43	Jan.	7 2	+87 10	Jan.	7 13	+82 34	Jan.	7 16	-86 54
0.5	25.81	48.31	0.5	5.15	36.15	0.5	42.13	53.42	0.5	57.32	27.41	0.5	37.37	2.82
1.5	25.72	48.68	1.5	5.15	36.56	1.5	42.22	53.69	1.5	57.36	27.66	1.5	37.39	3.23
2.5	25.62	49.05	2.5	5.13	36.97	2.5	42.33	53.97	2.5	57.42	27.90	2.5	37.39	3.64
3.5	25.48	49.43	3.5	5.10	37.38	3.5	42.46	54.23	3.5	57.49	28.14	3.5	37.36	4.05
4.5	25.35	49.78	4.5	5.06	37.78	4.5	42.59	54.51	4.5	57.56	28.38	4.5	37.30	4.45
5.4	25.20	50.12	5.5	5.03	38.16	5.5	42.74	54.80	5.5	57.63	28.64	5.5	37.22	4.83
6.4	25.05	50.44	6.5	4.99	38.53	6.5	42.88	55.10	6.5	57.70	28.93	6.5	37.13	5.20
7.4	24.90	50.72	7.5	4.95	38.87	7.5	43.01	55.42	7.5	57.77	29.24	7.5	37.02	5.56
8.4	24.75	51.00	8.5	4.91	39.20	8.5	43.12	55.76	8.5	57.83	29.56	8.5	36.91	5.90
9.4	24.61	51.28	9.5	4.86	39.53	9.5	43.21	56.11	9.5	57.88	29.90	9.5	36.81	6.23
10.4	24.48	51.55	10.5	4.82	39.85	10.5	43.26	56.46	10.5	57.92	30.23	10.5	36.72	6.54
11.4	24.35	51.83	11.5	4.78	40.18	11.5	43.28	56.81	11.5	57.93	30.56	11.5	36.63	6.86
12.4	24.21	52.11	12.5	4.74	40.51	12.5	43.29	57.15	12.5	57.94	30.89	12.5	36.55	7.20
13.4	24.07	52.40	13.5	4.70	40.86	13.5	43.25	57.48	13.5	57.95	31.22	13.5	36.48	7.55
14.4	23.93	52.71	14.5	4.66	41.22	14.5	43.21	57.78	14.5	57.95	31.51	14.5	36.41	7.91
15.4	23.79	53.04	15.5	4.62	41.60	15.5	43.17	58.07	15.5	57.95	31.78	15.5	36.32	8.28
16.4	23.62	53.37	16.5	4.57	41.98	16.5	43.14	58.34	16.5	57.95	32.05	16.5	36.21	8.67
17.4	23.45	53.70	17.5	4.51	42.38	17.5	43.13	58.61	17.5	57.95	32.31	17.5	36.08	9.07
18.4	23.25	54.02	18.5	4.45	42.76	18.5	43.14	58.88	18.5	57.98	32.56	18.5	35.91	9.48
19.4	23.05	54.30	19.5	4.37	43.13	19.5	43.17	59.17	19.5	58.01	32.82	19.5	35.73	9.86
20.4	22.82	54.58	20.4	4.29	43.47	20.5	43.21	59.47	20.5	58.04	33.10	20.5	35.50	10.23
21.4	22.60	54.82	21.4	4.21	43.79	21.5	43.25	59.78	21.5	58.07	33.42	21.5	35.27	10.57
22.4	22.40	55.04	22.4	4.13	44.09	22.5	43.27	60.12	22.5	58.09	33.74	22.5	35.04	10.90
23.4	22.20	55.24	23.4	4.05	44.38	23.5	43.24	60.47	23.5	58.10	34.08	23.5	34.82	11.19
24.4	22.01	55.45	24.4	3.97	44.66	24.4	43.18	60.81	24.5	58.10	34.42	24.5	34.62	11.48
25.4	21.82	55.69	25.4	3.90	44.96	25.4	43.08	61.14	25.5	58.06	34.76	25.5	34.43	11.78
26.4	21.64	55.93	26.4	3.82	45.27	26.4	42.94	61.46	26.5	58.02	35.07	26.5	34.25	12.10
27.4	21.45	56.19	27.4	3.74	45.59	27.4	42.79	61.76	27.4	57.97	35.36	27.5	34.08	12.44
28.4	21.26	56.46	28.4	3.67	45.93	28.4	42.63	62.05	28.4	57.93	35.63	28.4	33.91	12.80
29.4	21.05	56.75	29.4	3.59	46.30	29.4	42.48	62.31	29.4	57.88	35.87	29.4	33.71	13.18
30.4	20.82	57.03	30.4	3.51	46.65	30.4	42.35	62.56	30.4	57.84	36.10	30.4	33.48	13.55
31.4	20.59	57.30	31.4	3.41	46.99	31.4	42.24	62.81	31.4	57.81	36.35	31.4	33.22	13.93
11.10	-11.05		6.21	-6.12		20.35	+20.32		7.74	+7.67		18.50	-18.48	
5 <sup>h</sup> 46 <sup>m</sup>	14° 75'6"		6 <sup>h</sup> 46 <sup>m</sup>	53° 54'6"		7 <sup>h</sup> 2 <sup>m</sup>	4° 04'8"		7 <sup>h</sup> 13 <sup>m</sup>	42° 29'4"		7 <sup>h</sup> 16 <sup>m</sup>	20° 29'2"	
-84° 49'	46'' 89		-80° 43'	38'' 16		+87° 10'	54'' 74		+82° 34'	30'' 13		-86° 54'	6'' 70	



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 8 17	° ' " +88 52	Jan.	h m 9 9	° ' " -85 19	Jan.	h m 9 25	° ' " +81 41	Jan.	h m 9 36	° ' " -80 33	Jan.	h m 10 21	° ' " +82 58
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	16.68	50.38	0.6	6.86	47.99	0.6	32.61	24.46	0.6	26.82	56.57	0.7	14.97	32.37
1.6	17.19	50.64	1.6	7.03	48.34	1.6	32.71	24.64	1.6	26.91	56.91	1.6	15.11	32.50
2.6	17.73	50.89	2.6	7.18	48.72	2.6	32.82	24.80	2.6	27.01	57.27	2.6	15.28	32.62
3.6	18.30	51.12	3.6	7.32	49.11	3.6	32.95	24.95	3.6	27.11	57.65	3.6	15.42	32.71
4.6	18.93	51.36	4.6	7.45	49.49	4.6	33.08	25.10	4.6	27.20	58.02	4.6	15.59	32.79
5.6	19.57	51.59	5.6	7.55	49.86	5.6	33.21	25.26	5.6	27.27	58.40	5.6	15.76	32.88
6.6	20.24	51.87	6.6	7.63	50.23	6.6	33.34	25.43	6.6	27.34	58.78	6.6	15.94	33.01
7.5	20.89	52.15	7.6	7.71	50.59	7.6	33.48	25.63	7.6	27.40	59.11	7.6	16.13	33.14
8.5	21.52	52.45	8.6	7.78	50.93	8.6	33.61	25.85	8.6	27.46	59.45	8.6	16.31	33.29
9.5	22.09	52.78	9.6	7.84	51.27	9.6	33.73	26.09	9.6	27.51	59.79	9.6	16.49	33.47
10.5	22.59	53.11	10.6	7.92	51.60	10.6	33.84	26.34	10.6	27.57	60.12	10.6	16.65	33.66
11.5	23.02	53.43	11.6	8.00	51.93	11.6	33.94	26.60	11.6	27.62	60.44	11.6	16.81	33.87
12.5	23.39	53.75	12.6	8.08	52.26	12.6	34.05	26.86	12.6	27.68	60.77	12.6	16.96	34.08
13.5	23.69	54.08	13.6	8.17	52.59	13.6	34.14	27.13	13.6	27.74	61.11	13.6	17.09	34.29
14.5	23.93	54.40	14.6	8.26	52.94	14.6	34.22	27.37	14.6	27.81	61.46	14.6	17.21	34.49
15.5	24.15	54.70	15.6	8.35	53.32	15.6	34.29	27.61	15.6	27.88	61.82	15.6	17.34	34.70
16.5	24.38	54.97	16.6	8.44	53.72	16.6	34.37	27.84	16.6	27.95	62.19	16.6	17.45	34.90
17.5	24.64	55.24	17.6	8.53	54.13	17.6	34.45	28.04	17.6	28.01	62.60	17.6	17.57	35.08
18.5	24.94	55.47	18.6	8.58	54.55	18.6	34.53	28.24	18.6	28.07	63.02	18.6	17.70	35.24
19.5	25.31	55.73	19.6	8.62	54.97	19.6	34.63	28.46	19.6	28.12	63.45	19.6	17.83	35.40
20.5	25.72	56.00	20.5	8.63	55.41	20.6	34.73	28.68	20.6	28.16	63.88	20.6	17.98	35.57
21.5	26.14	56.31	21.5	8.64	55.82	21.6	34.84	28.90	21.6	28.19	64.29	21.6	18.14	35.75
22.5	26.54	56.65	22.5	8.63	56.19	22.6	34.95	29.16	22.6	28.21	64.66	22.6	18.30	35.95
23.5	26.85	56.99	23.5	8.61	56.54	23.6	35.06	29.45	23.6	28.23	65.04	23.6	18.45	36.18
24.5	27.09	57.34	24.5	8.61	56.88	24.6	35.14	29.76	24.6	28.25	65.38	24.6	18.59	36.45
25.5	27.21	57.71	25.5	8.62	57.23	25.5	35.20	30.09	25.6	28.27	65.72	25.6	18.71	36.72
26.5	27.22	58.04	26.5	8.64	57.58	26.5	35.26	30.38	26.6	28.30	66.08	26.6	18.81	37.00
27.5	27.18	58.36	27.5	8.67	57.95	27.5	35.30	30.67	27.5	28.33	66.45	27.6	18.90	37.27
28.5	27.10	58.66	28.5	8.70	58.34	28.5	35.33	30.95	28.5	28.37	66.84	28.6	18.98	37.52
29.5	27.04	58.94	29.5	8.73	58.75	29.5	35.37	31.21	29.5	28.41	67.25	29.6	19.05	37.76
30.5	27.00	59.21	30.5	8.74	59.17	30.5	35.42	31.45	30.5	28.45	67.67	30.6	19.13	37.99
31.5	27.01	59.48	31.5	8.74	59.61	31.5	35.46	31.70	31.5	28.47	68.11	31.6	19.22	38.21
51.25	+51.24		12.29	-12.25		6.92	+6.85		6.10	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".07		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

77 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			1 Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 10 59	° ' -84 8	Jan.	h m 12 14	° ' +88 9	Jan.	h m 12 46	° ' -84 40	Jan.	h m 12 48	° ' +83 51	Jan.	h m 13 27	° ' -85 21
	s 58.98	" 37.88		s 38.79	" 9.03		s 6.64	" 9.16		s 31.72	" 23.04		s 11.96	" 29.57
0.7	59.20	38.10	0.7	39.39	9.04	0.8	6.93	9.21	0.8	31.91	22.99	0.8	12.29	29.57
1.7	59.42	38.34	1.7	39.98	9.03	1.8	7.23	9.30	1.8	32.09	22.90	1.8	12.62	29.59
2.7	59.62	38.62	2.7	40.58	8.99	2.7	7.52	9.38	2.7	32.28	22.82	2.8	12.97	29.63
3.7			3.7			3.7			3.7			3.8		
4.7	59.83	38.91	4.7	41.21	8.96	4.7	7.81	9.51	4.7	32.47	22.74	4.8	13.31	29.69
5.7	60.02	39.20	5.7	41.86	8.92	5.7	8.09	9.66	5.7	32.67	22.64	5.8	13.64	29.77
6.7	60.21	39.49	6.7	42.57	8.88	6.7	8.34	9.80	6.7	32.90	22.54	6.8	13.96	29.85
7.7	60.37	39.77	7.7	43.30	8.87	7.7	8.60	9.96	7.7	33.13	22.48	7.8	14.25	29.95
8.7	60.51	40.05	8.7	44.05	8.87	8.7	8.84	10.11	8.7	33.36	22.42	8.8	14.53	30.04
9.7	60.67	40.33	9.7	44.80	8.88	9.7	9.06	10.27	9.7	33.59	22.37	9.8	14.81	30.12
10.7	60.82	40.59	10.7	45.54	8.92	10.7	9.29	10.41	10.7	33.82	22.34	10.8	15.08	30.19
11.7	60.97	40.84	11.7	46.26	8.99	11.7	9.51	10.52	11.7	34.05	22.35	11.8	15.35	30.25
12.6	61.13	41.09	12.7	46.97	9.07	12.7	9.75	10.64	12.7	34.27	22.36	12.7	15.63	30.31
13.6	61.29	41.35	13.7	47.64	9.15	13.7	9.99	10.77	13.7	34.47	22.39	13.7	15.92	30.36
14.6	61.47	41.61	14.7	48.26	9.24	14.7	10.24	10.90	14.7	34.67	22.43	14.7	16.22	30.42
15.6	61.65	41.90	15.7	48.86	9.32	15.7	10.50	11.04	15.7	34.87	22.46	15.7	16.58	30.50
16.6	61.82	42.21	16.7	49.42	9.40	16.7	10.78	11.21	16.7	35.05	22.49	16.7	16.86	30.59
17.6	62.01	42.53	17.7	49.98	9.47	17.7	11.06	11.39	17.7	35.23	22.51	17.7	17.21	30.71
18.6	62.19	42.89	18.7	50.55	9.53	18.7	11.34	11.61	18.7	35.42	22.51	18.7	17.55	30.85
19.6	62.33	43.25	19.7	51.16	9.58	19.7	11.61	11.83	19.7	35.61	22.51	19.7	17.88	31.02
20.6	62.48	43.61	20.7	51.81	9.61	20.7	11.87	12.07	20.7	35.83	22.50	20.7	18.20	31.20
21.6	62.61	43.99	21.7	52.50	9.66	21.7	12.10	12.34	21.7	36.06	22.49	21.7	18.50	31.41
22.6	62.71	44.36	22.7	53.21	9.74	22.7	12.31	12.59	22.7	36.28	22.51	22.7	18.77	31.61
23.6	62.81	44.69	23.7	53.93	9.83	23.7	12.51	12.82	23.7	36.51	22.55	23.7	19.04	31.79
24.6	62.91	45.01	24.7	54.65	9.97	24.7	12.71	13.04	24.7	36.74	22.60	24.7	19.28	31.94
25.6	63.02	45.30	25.7	55.31	10.11	25.7	12.91	13.24	25.7	36.95	22.70	25.7	19.55	32.09
26.6	63.15	45.61	26.7	55.92	10.29	26.7	13.13	13.43	26.7	37.15	22.80	26.7	19.82	32.23
27.6	63.28	45.93	27.7	56.48	10.47	27.7	13.36	13.62	27.7	37.34	22.93	27.7	20.10	32.37
28.6	63.43	46.27	28.7	56.99	10.64	28.7	13.61	13.83	28.7	37.52	23.06	28.7	20.41	32.52
29.6	63.57	46.62	29.7	57.47	10.79	29.7	13.86	14.06	29.7	37.68	23.17	29.7	20.73	32.69
30.6	63.71	46.99	30.6	57.97	10.93	30.7	14.11	14.32	30.7	37.85	23.28	30.7	21.05	32.88
31.6	63.84	47.38	31.6	58.47	11.07	31.7	14.36	14.59	31.7	38.02	23.37	31.7	21.37	33.09
9.80	-9.75		31.02	+31.00		10.76	-10.72		9.34	+9.29		12.36	-12.32	
10 <sup>h</sup> 59 <sup>m</sup>	55 <sup>s</sup> .280		12 <sup>h</sup> 14 <sup>m</sup>	28 <sup>s</sup> .425		12 <sup>h</sup> 46 <sup>m</sup>	7 <sup>s</sup> .152		12 <sup>h</sup> 48 <sup>m</sup>	30 <sup>s</sup> .418		13 <sup>h</sup> 27 <sup>m</sup>	14 <sup>s</sup> .624	
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2233. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Jan.	14 13	-83 17	Jan.	15 3	+87 32	Jan.	15 23	-84 11	Jan.	16 54	+82 10	Jan.	17 15	-80 46
	s	"		s	"		s	"		s	"		s	"
0.8	24.85	9.66	0.9	19.12	47.42	0.9	50.93	21.57	0.9	14.86	19.09	0.9	50.39	63.65
1.8	25.07	9.57	1.8	19.46	47.20	1.9	51.15	21.38	1.9	14.92	18.78	1.9	50.47	63.32
2.8	25.30	9.51	2.8	19.78	46.99	2.9	51.39	21.19	2.9	14.97	18.49	2.9	50.59	63.02
3.8	25.54	9.47	3.8	20.09	46.76	3.9	51.64	21.03	3.9	15.02	18.18	3.9	50.69	62.73
4.8	25.78	9.44	4.8	20.42	46.54	4.9	51.89	20.89	4.9	15.06	17.88	4.9	50.82	62.45
5.8	26.02	9.45	5.8	20.76	46.30	5.8	52.15	20.78	5.9	15.12	17.56	5.9	50.95	62.19
6.8	26.25	9.48	6.8	21.13	46.06	6.8	52.39	20.70	6.9	15.18	17.22	6.9	51.07	61.95
7.8	26.46	9.51	7.8	21.54	45.80	7.8	52.64	20.62	7.9	15.26	16.87	7.9	51.19	61.74
8.8	26.66	9.52	8.8	21.98	45.56	8.8	52.86	20.55	8.9	15.34	16.53	8.9	51.30	61.53
9.8	26.87	9.54	9.8	22.43	45.35	9.8	53.09	20.46	9.9	15.43	16.20	9.9	51.40	61.32
10.8	27.06	9.56	10.8	22.90	45.15	10.8	53.29	20.37	10.9	15.52	15.87	10.9	51.51	61.10
11.8	27.25	9.57	11.8	23.38	44.96	11.8	53.50	20.28	11.9	15.61	15.55	11.9	51.60	60.88
12.8	27.45	9.57	12.8	23.86	44.79	12.8	53.72	20.19	12.9	15.69	15.25	12.9	51.70	60.66
13.8	27.65	9.57	13.8	24.33	44.65	13.8	53.95	20.07	13.9	15.81	14.96	13.9	51.80	60.42
14.8	27.87	9.56	14.8	24.77	44.51	14.8	54.17	19.95	14.9	15.91	14.70	14.9	51.91	60.16
15.8	28.09	9.57	15.8	25.20	44.38	15.8	54.41	19.83	15.9	16.01	14.46	15.9	52.02	59.90
16.8	28.32	9.57	16.8	25.62	44.26	16.8	54.68	19.73	16.9	16.10	14.22	16.9	52.15	59.65
17.8	28.57	9.61	17.8	26.00	44.13	17.8	54.95	19.64	17.9	16.19	13.98	17.9	52.29	59.41
18.8	28.82	9.68	18.8	26.39	43.99	18.8	55.23	19.58	18.9	16.28	13.72	18.9	52.44	59.17
19.8	29.07	9.77	19.8	26.79	43.81	19.8	55.52	19.54	19.9	16.37	13.44	19.9	52.60	58.96
20.8	29.31	9.88	20.8	27.21	43.63	20.8	55.81	19.53	20.9	16.45	13.16	20.9	52.76	58.77
21.8	29.54	10.02	21.8	27.68	43.46	21.8	56.09	19.54	21.9	16.55	12.86	21.9	52.93	58.62
22.8	29.75	10.16	22.8	28.16	43.28	22.8	56.34	19.56	22.9	16.66	12.55	22.9	53.07	58.48
23.8	29.98	10.28	23.8	28.67	43.13	23.8	56.58	19.57	23.9	16.78	12.26	23.9	53.21	58.35
24.7	30.14	10.38	24.8	29.21	43.00	24.8	56.81	19.58	24.9	16.91	11.97	24.9	53.34	58.19
25.7	30.33	10.46	25.8	29.74	42.90	25.8	57.04	19.55	25.9	17.04	11.72	25.9	53.46	58.02
26.7	30.53	10.53	26.8	30.26	42.84	26.8	57.27	19.52	26.9	17.17	11.49	26.9	53.58	57.84
27.7	30.75	10.62	27.8	30.76	42.78	27.8	57.51	19.47	27.9	17.31	11.29	27.9	53.71	57.65
28.7	30.97	10.69	28.8	31.23	42.74	28.8	57.77	19.43	28.9	17.43	11.11	28.9	53.84	57.46
29.7	31.20	10.77	29.8	31.68	42.70	29.8	58.04	19.39	29.9	17.56	10.93	29.9	53.99	57.23
30.7	31.45	10.86	30.8	32.10	42.65	30.8	58.32	19.38	30.9	17.67	10.75	30.9	54.16	57.03
31.7	31.69	11.01	31.8	32.52	42.60	31.8	58.62	19.39	31.9	17.79	10.57	31.9	54.32	56.84
32.7	31.95	11.16	32.8	32.93	42.55	32.8	58.93	19.38	32.9	17.94	10.37	32.9	54.48	56.65
33.7	32.21	11.31	33.8	33.34	42.50	33.8	59.24	19.39	33.9	18.09	10.17	33.9	54.64	56.46
34.7	32.47	11.46	34.8	33.75	42.45	34.8	59.55	19.40	34.9	18.24	9.97	34.9	54.80	56.27
35.7	32.73	11.61	35.8	34.16	42.40	35.8	59.86	19.41	35.9	18.39	9.77	35.9	54.96	56.08
36.7	32.99	11.76	36.8	34.57	42.35	36.8	60.17	19.42	36.9	18.54	9.57	36.9	55.12	55.89
37.7	33.25	11.91	37.8	34.98	42.30	37.8	60.48	19.43	37.9	18.69	9.37	37.9	55.28	55.70
38.7	33.51	12.06	38.8	35.39	42.25	38.8	60.79	19.44	38.9	18.84	9.17	38.9	55.44	55.51
39.7	33.77	12.21	39.8	35.80	42.20	39.8	61.10	19.45	39.9	18.99	8.97	39.9	55.60	55.32
40.7	34.03	12.36	40.8	36.21	42.15	40.8	61.41	19.46	40.9	19.14	8.77	40.9	55.76	55.13
41.7	34.29	12.51	41.8	36.62	42.10	41.8	61.72	19.47	41.9	19.29	8.57	41.9	55.92	54.94
42.7	34.55	12.66	42.8	37.03	42.05	42.8	62.03	19.48	42.9	19.44	8.37	42.9	56.08	54.75
43.7	34.81	12.81	43.8	37.44	42.00	43.8	62.34	19.49	43.9	19.59	8.17	43.9	56.24	54.56
44.7	35.07	12.96	44.8	37.85	41.95	44.8	62.65	19.50	44.9	19.74	7.97	44.9	56.40	54.37
45.7	35.33	13.11	45.8	38.26	41.90	45.8	62.96	19.51	45.9	19.89	7.77	45.9	56.56	54.18
46.7	35.59	13.26	46.8	38.67	41.85	46.8	63.27	19.52	46.9	20.04	7.57	46.9	56.72	53.99
47.7	35.85	13.41	47.8	39.08	41.80	47.8	63.58	19.53	47.9	20.19	7.37	47.9	56.88	53.80
48.7	36.11	13.56	48.8	39.49	41.75	48.8	63.89	19.54	48.9	20.34	7.17	48.9	57.04	53.61
49.7	36.37	13.71	49.8	39.90	41.70	49.8	64.20	19.55	49.9	20.49	6.97	49.9	57.20	53.42
50.7	36.63	13.86	50.8	40.31	41.65	50.8	64.51	19.56	50.9	20.64	6.77	50.9	57.36	53.23
51.7	36.89	14.01	51.8	40.72	41.60	51.8	64.82	19.57	51.9	20.79	6.57	51.9	57.52	53.04
52.7	37.15	14.16	52.8	41.13	41.55	52.8	65.13	19.58	52.9	20.94	6.37	52.9	57.68	52.85
53.7	37.41	14.31	53.8	41.54	41.50	53.8	65.44	19.59	53.9	21.09	6.17	53.9	57.84	52.66
54.7	37.67	14.46	54.8	41.95	41.45	54.8	65.75	19.60	54.9	21.24	5.97	54.9	58.00	52.47
55.7	37.93	14.61	55.8	42.36	41.40	55.8	66.06	19.61	55.9	21.39	5.77	55.9	58.16	52.28
56.7	38.19	14.76	56.8	42.77	41.35	56.8	66.37	19.62	56.9	21.54	5.57	56.9	58.32	52.09
57.7	38.45	14.91	57.8	43.18	41.30	57.8	66.68	19.63	57.9	21.69	5.37	57.9	58.48	51.90
58.7	38.71	15.06	58.8	43.59	41.25	58.8	66.99	19.64	58.9	21.84	5.17	58.9	58.64	51.71
59.7	38.97	15.21	59.8	44.00	41.20	59.8	67.30	19.65	59.9	21.99	4.97	59.9	58.80	51.52
60.7	39.23	15.36	60.8	44.41	41.15	60.8	67.61	19.66	60.9	22.14	4.77	60.9	58.96	51.33
61.7	39.49	15.51	61.8	44.82	41.10	61.8	67.92	19.67	61.9	22.29	4.57	61.9	59.12	51.14
62.7	39.75	15.66	62.8	45.23	41.05	62.8	68.23	19.68	62.9	22.44	4.37	62.9	59.28	50.95
63.7	40.01	15.81	63.8	45.64	41.00	63.8	68.54	19.69	63.9	22.59	4.17	63.9	59.44	50.76
64.7	40.27	15.96	64.8	46.05	40.95	64.8	68.85	19.70	64.9	22.74	3.97	64.9	59.60	50.57
65.7	40.53	16.11	65.8	46.46	40.90	65.8	69.16	19.71	65.9	22.89	3.77	65.9	59.76	50.38
66.7	40.79	16.26	66.8	46.87	40.85	66.8	69.47	19.72	66.9	23.04	3.57	66.9	59.92	50.19
67.7	41.05	16.41	67.8	47.28	40.80	67.8	69.78	19.73	67.9	23.19	3.37	67.9	60.08	50.00
68.7	41.31	16.56	68.8	47.69	40.75	68.8	70.09	19.74	68.9	23.34	3.17	68.9	60.24	49.81
69.7	41.57	16.71	69.8	48.10	40.70	69.8	70.40	19.75	69.9	23.49	2.97	69.9	60.40	49.62
70.7	41.83	16.86	70.8	48.51	40.65	70.8	70.71	19.76	70.9	23.64	2.77	70.9	60.56	49.43
71.7	42.09	17.01	71.8	48.92	40.60	71.8	71.02	19.77	71.9	23.79	2.57	71.9	60.72	49.24
72.7	42.35	17.16	72.8	49.33	40.55	72.8	71.33	19.78	72.9	23.94	2.37	72.9	60.88	49.05
73.7	42.61	17.31	73.8	49.74	40.50	73.8	71.64	19.79	73.9	24.09	2.17	73.9	61.04	48.86
74.7	42.87	17.46	74.8	50.15	40.45	74.8	71.95	19.80	74.9	24.24	1.97	74.9	61.20	48.67
75.7	43.13	17.61	75.8	50.56	40.40	75.8	72.26	19.81	75.9	24.39	1.77	75.9	61.36	48.48
76.7	43.39	17.76	76.8	50.97	40.35	76.8	72.57							

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m 17 58	° ' +86 36	Jan.	h m 18 5	° ' -87 39	Jan.	h m 19 0	° ' +89 0	Jan.	h m 19 26	° ' -89 13	Jan.	h m 20 48	° ' +82 13
	s "	"		s "	"		s "	"		s "	"		s "	"
0.9	32.24	44.64	0.9	50.69	51.56	1.0	54.17	63.20	1.0	39.88	32.96	1.1	29.69	42.76
1.9	32.28	44.34	1.9	50.91	51.18	2.0	53.94	62.90	2.0	39.81	32.57	2.1	29.61	42.52
2.9	32.30	44.06	2.9	51.16	50.79	3.0	53.66	62.61	3.0	39.86	32.16	3.1	29.53	42.30
3.9	32.30	43.77	3.9	51.44	50.43	4.0	53.34	62.34	4.0	40.03	31.76	4.1	29.45	42.07
4.9	32.31	43.45	4.9	51.75	50.09	5.0	52.99	62.04	5.0	40.33	31.38	5.1	29.36	41.83
5.9	32.32	43.13	5.9	52.09	49.77	5.9	52.64	61.72	6.0	40.69	31.01	6.1	29.27	41.59
6.9	32.33	42.79	6.9	52.43	49.47	6.9	52.31	61.41	7.0	41.09	30.65	7.1	29.18	41.31
7.9	32.37	42.45	7.9	52.76	49.19	7.9	52.03	61.07	8.0	41.50	30.31	8.1	29.07	41.03
8.9	32.42	42.08	8.9	53.08	48.91	8.9	51.81	60.71	9.0	41.90	29.99	9.1	28.98	40.72
9.9	32.51	41.71	9.9	53.38	48.65	9.9	51.65	60.35	10.0	42.28	29.68	10.1	28.90	40.41
10.9	32.59	41.36	10.9	53.67	48.37	10.9	51.58	59.99	11.0	42.61	29.35	11.1	28.81	40.09
11.9	32.70	41.01	11.9	53.95	48.09	11.9	51.59	59.64	12.0	42.89	29.02	12.1	28.75	39.76
12.9	32.83	40.68	12.9	54.23	47.81	12.9	51.66	59.29	12.9	43.15	28.68	13.1	28.68	39.42
13.9	32.96	40.35	13.9	54.50	47.50	13.9	51.77	58.95	13.9	43.41	28.34	14.1	28.63	39.09
14.9	33.10	40.07	14.9	54.79	47.19	14.9	51.93	58.65	14.9	43.68	27.98	15.0	28.58	38.79
15.9	33.24	39.79	15.9	55.11	46.87	15.9	52.07	58.36	15.9	44.01	27.60	16.0	28.54	38.51
16.9	33.37	39.52	16.9	55.47	46.54	16.9	52.18	58.08	16.9	44.44	27.22	17.0	28.50	38.24
17.9	33.47	39.26	17.9	55.88	46.20	17.9	52.25	57.80	17.9	45.00	26.81	18.0	28.46	38.00
18.9	33.57	38.98	18.9	56.33	45.89	18.9	52.27	57.52	18.9	45.70	26.42	19.0	28.42	37.73
19.9	33.67	38.68	19.9	56.81	45.60	19.9	52.24	57.24	19.9	46.53	26.04	20.0	28.36	37.46
20.9	33.76	38.37	20.9	57.32	45.32	20.9	52.18	56.92	20.9	47.46	25.70	21.0	28.30	37.16
21.9	33.86	38.04	21.9	57.81	45.08	21.9	52.17	56.58	21.9	48.40	25.36	22.0	28.24	36.84
22.9	34.00	37.70	22.9	58.28	44.85	22.9	52.25	56.21	22.9	49.33	25.04	23.0	28.18	36.50
23.9	34.16	37.36	23.9	58.72	44.63	23.9	52.40	55.85	23.9	50.17	24.75	24.0	28.13	36.15
24.9	34.35	37.02	24.9	59.14	44.42	24.9	52.66	55.49	24.9	50.93	24.46	25.0	28.09	35.79
25.9	34.57	36.72	25.9	59.52	44.18	25.9	53.04	55.15	25.9	51.59	24.14	26.0	28.06	35.44
26.9	34.79	36.43	26.9	59.90	43.90	26.9	53.49	54.83	26.9	52.21	23.81	27.0	28.04	35.09
27.9	35.01	36.19	27.9	60.30	43.62	27.9	53.97	54.54	27.9	52.84	23.45	28.0	28.04	34.75
28.9	35.24	35.95	28.9	60.72	43.33	28.9	54.45	54.26	28.9	53.54	23.09	29.0	28.04	34.45
29.9	35.44	35.72	29.9	61.19	43.04	29.9	54.88	54.01	29.9	54.33	22.72	30.0	28.04	34.17
30.9	35.64	35.49	30.9	61.69	42.76	30.9	55.27	53.77	30.9	55.24	22.35	31.0	28.04	33.91
31.9	35.82	35.26	31.9	62.23	42.49	31.9	55.64	53.50	31.9	56.28	21.99	32.0	28.03	33.63
16.92	+16.89		24.52	-24.50		58.24	+58.23		73.87	-73.86		7.39	+7.33	
17 <sup>h</sup> 59 <sup>m</sup>	1° 30'		18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup>	893		19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup>	624		19 <sup>h</sup> 27 <sup>m</sup>	42° 218		20 <sup>h</sup> 48 <sup>m</sup>	40° 494	
+86° 36'	51'' 17		-87° 39'	51'' 82		+89° 1'	2'' 17		-89° 13'	28'' 57		+82° 13'	29'' 86	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Jan.	h m    ° ' "	° ' "	Jan.	h m    ° ' "	° ' "	Jan.	h m    ° ' "	° ' "	Jan.	h m    ° ' "	° ' "	Jan.	h m    ° ' "	° ' "
	21 38    -83 6			22 15    -86 23			22 37    -81 49			23 27    +86 51			23 47    -82 28	
	s        "        "			s        "        "			s        "        "			s        "        "			s        "        "	
1.1	15.83    17.67	1.1	62.64    39.06	1.2	37.43    14.78	1.2	32.94    24.28	1.2	16.63    61.91					
2.1	15.72    17.36	2.1	62.36    38.78	2.2	37.30    14.53	2.2	32.61    24.23	2.2	16.46    61.78					
3.1	15.61    17.03	3.1	62.09    38.46	3.2	37.18    14.27	3.2	32.29    24.19	3.2	16.29    61.62					
4.1	15.52    16.69	4.1	61.86    38.15	4.2	37.08    14.00	4.2	31.95    24.15	4.2	16.14    61.44					
5.1	15.45    16.36	5.1	61.64    37.83	5.2	36.97    13.72	5.2	31.59    24.11	5.2	15.98    61.23					
6.1	15.39    16.02	6.1	61.44    37.52	6.1	36.87    13.44	6.2	31.22    24.06	6.2	15.84    61.03					
7.1	15.33    15.70	7.1	61.26    37.22	7.1	36.79    13.17	7.2	30.83    24.01	7.2	15.71    60.82					
8.1	15.28    15.40	8.1	61.10    36.93	8.1	36.72    12.91	8.2	30.42    23.94	8.2	15.58    60.63					
9.1	15.23    15.11	9.1	60.94    36.65	9.1	36.64    12.65	9.2	30.01    23.85	9.2	15.46    60.44					
10.1	15.17    14.82	10.1	60.77    36.37	10.1	36.56    12.41	10.2	29.60    23.73	10.2	15.33    60.25					
11.1	15.11    14.53	11.1	60.60    36.10	11.1	36.48    12.17	11.2	29.20    23.60	11.2	15.21    60.08					
12.1	15.05    14.24	12.1	60.43    35.83	12.1	36.39    11.93	12.2	28.82    23.45	12.2	15.09    59.93					
13.1	14.97    13.95	13.1	60.24    35.55	13.1	36.30    11.69	13.2	28.45    23.28	13.2	14.94    59.76					
14.1	14.90    13.64	14.1	60.03    35.26	14.1	36.19    11.42	14.2	28.12    23.11	14.2	14.79    59.58					
15.1	14.82    13.33	15.1	59.82    34.95	15.1	36.09    11.16	15.2	27.79    22.96	15.2	14.64    59.40					
16.1	14.74    13.00	16.1	59.61    34.64	16.1	35.99    10.87	16.2	27.51    22.81	16.2	14.48    59.19					
17.1	14.68    12.63	17.1	59.40    34.31	17.1	35.88    10.56	17.2	27.22    22.67	17.2	14.33    58.96					
18.1	14.62    12.26	18.1	59.22    33.94	18.1	35.79    10.24	18.2	26.93    22.57	18.2	14.19    58.70					
19.1	14.59    11.87	19.1	59.07    33.56	19.1	35.73    9.90	19.1	26.63    22.46	19.2	14.05    58.42					
20.1	14.57    11.47	20.1	58.95    33.19	20.1	35.66    9.53	20.1	26.31    22.33	20.2	13.92    58.14					
21.1	14.56    11.09	21.1	58.86    32.80	21.1	35.61    9.16	21.1	25.98    22.21	21.2	13.83    57.85					
22.1	14.57    10.73	22.1	58.78    32.42	22.1	35.58    8.82	22.1	25.61    22.08	22.2	13.73    57.55					
23.1	14.57    10.39	23.1	58.73    32.09	23.1	35.54    8.48	23.1	25.23    21.91	23.2	13.63    57.26					
24.1	14.57    10.05	24.1	58.65    31.77	24.1	35.50    8.17	24.1	24.86    21.72	24.1	13.55    57.02					
25.1	14.56    9.73	25.1	58.56    31.45	25.1	35.45    7.89	25.1	24.51    21.49	25.1	13.45    56.78					
26.1	14.53    9.42	26.1	58.43    31.13	26.1	35.39    7.60	26.1	24.19    21.26	26.1	13.32    56.54					
27.1	14.49    9.09	27.1	58.31    30.81	27.1	35.31    7.31	27.1	23.90    21.02	27.1	13.20    56.30					
28.0	14.45    8.73	28.1	58.16    30.46	28.1	35.23    7.00	28.1	23.65    20.79	28.1	13.07    56.04					
29.0	14.41    8.37	29.1	58.01    30.10	29.1	35.15    6.67	29.1	23.41    20.57	29.1	12.93    55.77					
30.0	14.38    7.99	30.1	57.87    29.73	30.1	35.08    6.30	30.1	23.19    20.36	30.1	12.81    55.46					
31.0	14.37    7.57	31.1	57.77    29.33	31.1	35.03    5.94	31.1	22.96    20.17	31.1	12.68    55.15					
32.0	14.37    7.15	32.1	57.70    28.93	32.1	34.98    5.55	32.1	22.72    19.98	32.1	12.58    54.81					
8.33	-8.27	15.89	-15.86	7.03	-6.96	18.24	+18.21	7.64	-7.58					
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542		22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656		22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016		23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125		23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424						
-83° 6' 6".99		-86° 23' 27".13		-81° 49' 2".34		+86° 50' 58".89		-82° 28' 48".42						

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "
	0 56	+85 49		1 29	+88 52		1 41	-85 11		4 10	+85 20		5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.2	62.48	11.89	0.2	57.76	11.47	0.2	59.10	32.00	0.3	15.51	34.50	0.4	31.60	47.57
1.2	62.24	11.79	1.2	56.84	11.41	1.2	58.81	31.81	1.3	15.32	34.64	1.4	31.47	47.79
2.2	62.00	11.69	2.2	55.88	11.36	2.2	58.54	31.61	2.3	15.12	34.78	2.4	31.34	48.02
3.2	61.75	11.59	3.2	54.86	11.31	3.2	58.29	31.41	3.3	14.93	34.91	3.4	31.21	48.26
4.2	61.47	11.46	4.2	53.79	11.24	4.2	58.04	31.21	4.3	14.70	35.05	4.4	31.05	48.50
5.2	61.20	11.34	5.2	52.68	11.18	5.2	57.81	31.00	5.3	14.46	35.20	5.4	30.88	48.74
6.2	60.91	11.20	6.2	51.56	11.09	6.2	57.58	30.80	6.3	14.20	35.35	6.4	30.70	48.99
7.2	60.63	11.04	7.2	50.43	10.97	7.2	57.36	30.61	7.3	13.93	35.49	7.3	30.50	49.22
8.2	60.35	10.86	8.2	49.32	10.84	8.2	57.12	30.43	8.3	13.67	35.58	8.3	30.29	49.42
9.2	60.09	10.66	9.2	48.24	10.67	9.2	56.89	30.25	9.3	13.39	35.66	9.3	30.07	49.62
10.1	59.85	10.44	10.2	47.23	10.50	10.2	56.66	30.09	10.3	13.12	35.72	10.3	29.84	49.77
11.1	59.61	10.22	11.2	46.28	10.32	11.2	56.41	29.92	11.3	12.85	35.76	11.3	29.62	49.93
12.1	59.40	10.01	12.2	45.41	10.15	12.2	56.14	29.74	12.3	12.60	35.77	12.3	29.40	50.08
13.1	59.20	9.82	13.2	44.59	9.97	13.2	55.87	29.55	13.3	12.37	35.79	13.3	29.20	50.22
14.1	59.03	9.62	14.2	43.80	9.82	14.2	55.60	29.31	14.3	12.15	35.81	14.3	29.01	50.33
15.1	58.85	9.44	15.2	43.04	9.69	15.2	55.33	29.09	15.3	11.95	35.85	15.3	28.83	50.46
16.1	58.66	9.28	16.2	42.23	9.56	16.2	55.09	28.82	16.3	11.74	35.90	16.3	28.69	50.61
17.1	58.47	9.13	17.2	41.38	9.45	17.2	54.84	28.53	17.3	11.54	35.98	17.3	28.51	50.78
18.1	58.24	8.97	18.2	40.48	9.33	18.2	54.63	28.22	18.3	11.31	36.07	18.3	28.34	50.95
19.1	58.00	8.79	19.1	39.50	9.19	19.2	54.44	27.91	19.3	11.07	36.15	19.3	28.15	51.14
20.1	57.76	8.57	20.1	38.49	9.03	20.2	54.24	27.63	20.3	10.80	36.22	20.3	27.92	51.32
21.1	57.52	8.34	21.1	37.49	8.85	21.2	54.06	27.38	21.3	10.52	36.27	21.3	27.68	51.47
22.1	57.29	8.07	22.1	36.53	8.61	22.1	53.86	27.14	22.3	10.22	36.28	22.3	27.43	51.61
23.1	57.09	7.79	23.1	35.66	8.38	23.1	53.64	26.91	23.2	9.94	36.25	23.3	27.17	51.71
24.1	56.91	7.51	24.1	34.88	8.13	24.1	53.42	26.68	24.2	9.67	36.19	24.3	26.92	51.79
25.1	56.77	7.24	25.1	34.19	7.89	25.1	53.19	26.44	25.2	9.42	36.13	25.3	26.68	51.84
26.1	56.63	7.00	26.1	33.56	7.64	26.1	52.95	26.17	26.2	9.18	36.08	26.3	26.45	51.89
27.1	56.50	6.75	27.1	32.94	7.44	27.1	52.71	25.91	27.2	8.96	36.04	27.3	26.24	51.94
28.1	56.37	6.52	28.1	32.33	7.24	28.1	52.48	25.59	28.2	8.74	36.00	28.3	26.04	52.00
29.1	56.24	6.29	29.1	31.69	7.02	29.1	52.27	25.26	29.2	8.53	35.98	29.3	25.83	52.08
30.1	56.09	6.05	30.1	31.00	6.82	30.1	52.07	24.93	30.2	8.30	35.95	30.3	25.63	52.16
31.1	55.92	5.80	31.1	30.27	6.61	31.1	51.88	24.60	31.2	8.07	35.94	31.3	25.40	52.26
13.72 +13.68			50.68 +50.67			11.93 -11.89			12.32 +12.28			11.86 +11.82		
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			♄ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m 5 46	° ' " -84 49	Feb.	h m 6 46	° ' " -80 43	Feb.	h m 7 2	° ' " +87 11	Feb.	h m 7 13	° ' " +82 34	Feb.	h m 7 16	° ' " -86 54
	s "			s "			s "			s "			s "	
0.4	20.59	57.30	0.4	63.41	46.99	0.4	42.24	2.81	0.4	57.81	36.35	0.4	33.22	13.93
1.4	20.34	57.54	1.4	63.32	47.32	1.4	42.15	3.08	1.4	57.78	36.62	1.4	32.95	14.28
2.4	20.10	57.75	2.4	63.22	47.63	2.4	42.04	3.36	2.4	57.77	36.90	2.4	32.67	14.61
3.4	19.85	57.95	3.4	63.11	47.92	3.4	41.94	3.65	3.4	57.74	37.18	3.4	32.37	14.92
4.4	19.60	58.13	4.4	63.01	48.18	4.4	41.82	3.96	4.4	57.71	37.49	4.4	32.07	15.21
5.4	19.37	58.30	5.4	62.90	48.43	5.4	41.67	4.28	5.4	57.67	37.80	5.4	31.78	15.49
6.4	19.13	58.47	6.4	62.80	48.67	6.4	41.49	4.61	6.4	57.62	38.12	6.4	31.49	15.77
7.4	18.91	58.64	7.4	62.69	48.92	7.4	41.29	4.92	7.4	57.55	38.43	7.4	31.21	16.04
8.4	18.68	58.80	8.4	62.59	49.17	8.4	41.06	5.23	8.4	57.47	38.72	8.4	30.94	16.32
9.4	18.47	58.98	9.4	62.49	49.43	9.4	40.80	5.52	9.4	57.38	39.01	9.4	30.68	16.61
10.3	18.24	59.16	10.4	62.39	49.70	10.4	40.53	5.79	10.4	57.29	39.28	10.4	30.42	16.90
11.3	18.01	59.37	11.4	62.28	49.97	11.4	40.25	6.03	11.4	57.20	39.53	11.4	30.16	17.21
12.3	17.77	59.58	12.4	62.18	50.27	12.4	39.98	6.26	12.4	57.10	39.76	12.4	29.89	17.54
13.3	17.52	59.79	13.4	62.07	50.57	13.4	39.73	6.48	13.4	57.02	39.99	13.4	29.58	17.86
14.3	17.25	60.00	14.4	61.95	50.87	14.4	39.50	6.69	14.4	56.94	40.20	14.4	29.26	18.19
15.3	16.97	60.19	15.4	61.83	51.16	15.4	39.30	6.90	15.4	56.87	40.41	15.4	28.90	18.51
16.3	16.69	60.34	16.4	61.70	51.41	16.4	39.10	7.12	16.4	56.81	40.64	16.4	28.53	18.80
17.3	16.40	60.49	17.4	61.56	51.64	17.4	38.91	7.36	17.4	56.75	40.88	17.4	28.13	19.09
18.3	16.11	60.60	18.4	61.42	51.85	18.4	38.71	7.62	18.4	56.70	41.14	18.4	27.73	19.33
19.3	15.83	60.69	19.4	61.29	52.05	19.4	38.49	7.89	19.4	56.62	41.40	19.4	27.34	19.56
20.3	15.56	60.77	20.4	61.16	52.24	20.4	38.22	8.17	20.4	56.54	41.69	20.4	26.97	19.76
21.3	15.31	60.86	21.4	61.03	52.42	21.4	37.92	8.44	21.4	56.43	41.97	21.4	26.62	19.98
22.3	15.06	60.96	22.4	60.90	52.61	22.4	37.58	8.68	22.4	56.30	42.22	22.4	26.28	20.22
23.3	14.81	61.09	23.4	60.78	52.81	23.4	37.22	8.89	23.4	56.18	42.44	23.4	25.95	20.47
24.3	14.55	61.22	24.4	60.66	53.04	24.4	36.85	9.09	24.4	56.04	42.64	24.4	25.61	20.73
25.3	14.28	61.36	25.4	60.53	53.29	25.4	36.50	9.27	25.4	55.91	42.83	25.4	25.26	21.00
26.3	14.01	61.51	26.3	60.41	53.54	26.4	36.17	9.42	26.4	55.80	42.98	26.4	24.90	21.29
27.3	13.72	61.65	27.3	60.27	53.79	27.4	35.85	9.57	27.4	55.70	43.13	27.4	24.52	21.56
28.3	13.43	61.76	28.3	60.13	54.00	28.4	35.56	9.73	28.4	55.60	43.28	28.4	24.11	21.82
29.3	13.14	61.87	29.3	59.98	54.20	29.4	35.27	9.90	29.4	55.49	43.45	29.4	23.68	22.06
30.3	12.84	61.93	30.3	59.83	54.39	30.3	34.98	10.08	30.4	55.40	43.64	30.4	23.24	22.30
31.3	12.54	61.99	31.3	59.69	54.54	31.3	34.67	10.26	31.4	55.29	43.84	31.4	22.81	22.49
11.10	-11.06		6.21	-6.13		20.36	+20.34		7.74	+7.68		18.52	-18.49	
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb.	8 17	+88 52	Feb.	9 9	-85 19	Feb.	9 25	+81 41	Feb.	9 36	-80 34	Feb.	10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
0.5	27.01	59.48	0.5	8.74	59.61	0.5	35.46	31.70	0.5	28.47	8.11	0.6	19.22	38.21
1.5	27.05	59.75	1.5	8.72	60.04	1.5	35.51	31.94	1.5	28.48	8.55	1.6	19.32	38.43
2.5	27.11	60.06	2.5	8.69	60.45	2.5	35.57	32.21	2.5	28.49	8.98	2.6	19.42	38.66
3.5	27.16	60.37	3.5	8.64	60.85	3.5	35.64	32.49	3.5	28.49	9.39	3.6	19.53	38.91
4.5	27.19	60.70	4.5	8.58	61.22	4.5	35.69	32.79	4.5	28.49	9.77	4.6	19.63	39.17
5.5	27.18	61.03	5.5	8.52	61.58	5.5	35.74	33.10	5.5	28.49	10.16	5.6	19.73	39.44
6.5	27.10	61.40	6.5	8.46	61.94	6.5	35.79	33.41	6.5	28.48	10.52	6.6	19.83	39.75
7.5	26.94	61.74	7.5	8.40	62.29	7.5	35.82	33.74	7.5	28.47	10.88	7.5	19.92	40.06
8.5	26.71	62.08	8.5	8.35	62.64	8.5	35.84	34.08	8.5	28.46	11.23	8.5	19.98	40.38
9.5	26.42	62.42	9.5	8.30	63.00	9.5	35.85	34.41	9.5	28.45	11.60	9.5	20.03	40.70
10.5	26.07	62.74	10.5	8.26	63.36	10.5	35.85	34.73	10.5	28.46	11.96	10.5	20.08	41.02
11.5	25.70	63.04	11.5	8.23	63.74	11.5	35.84	35.05	11.5	28.46	12.34	11.5	20.12	41.32
12.4	25.30	63.33	12.5	8.19	64.11	12.5	35.83	35.34	12.5	28.46	12.75	12.5	20.15	41.61
13.4	24.92	63.60	13.5	8.15	64.53	13.5	35.82	35.62	13.5	28.46	13.15	13.5	20.18	41.89
14.4	24.59	63.85	14.5	8.09	64.94	14.5	35.82	35.88	14.5	28.45	13.58	14.5	20.21	42.16
15.4	24.31	64.11	15.5	8.00	65.37	15.5	35.84	36.14	15.5	28.44	14.02	15.5	20.26	42.41
16.4	24.09	64.38	16.5	7.90	65.79	16.5	35.86	36.40	16.5	28.41	14.46	16.5	20.31	42.65
17.4	23.90	64.65	17.5	7.78	66.19	17.5	35.89	36.67	17.5	28.38	14.88	17.5	20.38	42.91
18.4	23.68	64.96	18.5	7.64	66.57	18.5	35.91	36.94	18.5	28.34	15.27	18.5	20.45	43.20
19.4	23.43	65.27	19.5	7.50	66.93	19.5	35.92	37.26	19.5	28.30	15.64	19.5	20.51	43.50
20.4	23.09	65.58	20.5	7.37	67.26	20.5	35.93	37.59	20.5	28.25	16.00	20.5	20.56	43.82
21.4	22.66	65.90	21.5	7.25	67.59	21.5	35.93	37.93	21.5	28.21	16.35	21.5	20.60	44.15
22.4	22.12	66.23	22.5	7.15	67.92	22.5	35.90	38.26	22.5	28.16	16.71	22.5	20.60	44.49
23.4	21.51	66.52	23.5	7.05	68.27	23.5	35.86	38.59	23.5	28.13	17.07	23.5	20.61	44.83
24.4	20.84	66.78	24.5	6.95	68.63	24.5	35.82	38.89	24.5	28.11	17.45	24.5	20.60	45.15
25.4	20.18	67.02	25.5	6.85	69.01	25.5	35.77	39.17	25.5	28.08	17.84	25.5	20.58	45.45
26.4	19.55	67.26	26.4	6.75	69.40	26.5	35.72	39.43	26.5	28.05	18.25	26.5	20.57	45.73
27.4	18.97	67.48	27.4	6.63	69.81	27.5	35.68	39.68	27.5	28.02	18.67	27.5	20.55	46.02
28.4	18.41	67.70	28.4	6.50	70.20	28.5	35.65	39.94	28.5	27.98	19.08	28.5	20.55	46.29
29.4	17.89	67.94	29.4	6.35	70.58	29.5	35.62	40.19	29.5	27.94	19.48	29.5	20.55	46.56
30.4	17.38	68.21	30.4	6.18	70.95	30.5	35.60	40.47	30.5	27.88	19.86	30.5	20.57	46.84
31.4	16.87	68.46	31.4	6.01	71.29	31.4	35.58	40.75	31.5	27.82	20.24	31.5	20.58	47.15
51.37	+51.36		12.30	-12.25		6.92	+6.85		6.10	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup>	48 <sup>s</sup> .380		9 <sup>h</sup> 8 <sup>m</sup>	57 <sup>s</sup> .938		9 <sup>h</sup> 25 <sup>m</sup>	21 <sup>s</sup> .719		9 <sup>h</sup> 36 <sup>m</sup>	22 <sup>s</sup> .347		10 <sup>h</sup> 21 <sup>m</sup>	4 <sup>s</sup> .831	
+88° 53'	0'' .29		-85° 19'	57'' .45		+81° 41'	41'' .50		-80° 34'	6'' .83		+82° 58'	54'' .07	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

7 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			z Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb. 11 0	-84 8		Feb. 12 14	+88 9		Feb. 12 46	-84 40		Feb. 12 48	+83 51		Feb. 13 27	-85 21	
	s	"		s	"		s	"		s	"		s	"
0.6	3.84	47.38	0.6	58.47	11.07	0.7	14.36	14.59	0.7	38.02	23.37	0.7	21.37	33.09
1.6	3.95	47.78	1.6	59.01	11.22	1.7	14.61	14.87	1.7	38.20	23.46	1.7	21.68	33.33
2.6	4.05	48.17	2.6	59.57	11.36	2.7	14.84	15.17	2.7	38.38	23.55	2.7	21.97	33.57
3.6	4.14	48.56	3.6	60.16	11.49	3.7	15.03	15.47	3.7	38.58	23.64	3.7	22.24	33.80
4.6	4.22	48.95	4.6	60.76	11.66	4.7	15.22	15.76	4.7	38.79	23.75	4.7	22.49	34.04
5.6	4.28	49.32	5.6	61.37	11.85	5.7	15.40	16.06	5.7	38.99	23.88	5.7	22.73	34.28
6.6	4.34	49.68	6.6	61.96	12.05	6.7	15.59	16.34	6.7	39.20	24.03	6.7	22.97	34.53
7.6	4.40	50.03	7.6	62.54	12.26	7.7	15.76	16.62	7.7	39.40	24.19	7.7	23.21	34.73
8.6	4.49	50.36	8.6	63.09	12.49	8.6	15.93	16.87	8.6	39.58	24.37	8.7	23.44	34.93
9.6	4.56	50.70	9.6	63.59	12.73	9.6	16.11	17.12	9.6	39.75	24.57	9.7	23.67	35.14
10.6	4.64	51.05	10.6	64.06	12.98	10.6	16.29	17.37	10.6	39.91	24.78	10.7	23.92	35.35
11.6	4.72	51.41	11.6	64.48	13.24	11.6	16.49	17.64	11.6	40.06	25.00	11.7	24.19	35.55
12.6	4.81	51.78	12.6	64.87	13.49	12.6	16.70	17.93	12.6	40.21	25.22	12.7	24.46	35.78
13.6	4.91	52.16	13.6	65.24	13.72	13.6	16.92	18.23	13.6	40.34	25.42	13.7	24.75	36.02
14.6	5.00	52.58	14.6	65.60	13.93	14.6	17.14	18.55	14.6	40.48	25.60	14.7	25.04	36.30
15.6	5.06	53.01	15.6	65.98	14.14	15.6	17.34	18.89	15.6	40.62	25.77	15.7	25.32	36.59
16.6	5.12	53.44	16.6	66.40	14.34	16.6	17.54	19.26	16.6	40.78	25.92	16.7	25.59	36.91
17.5	5.16	53.89	17.6	66.86	14.54	17.6	17.72	19.63	17.6	40.94	26.07	17.7	25.84	37.24
18.5	5.17	54.31	18.6	67.34	14.73	18.6	17.87	20.00	18.6	41.11	26.24	18.6	26.06	37.56
19.5	5.19	54.70	19.6	67.84	14.96	19.6	18.01	20.35	19.6	41.29	26.42	19.6	26.26	37.87
20.5	5.20	55.08	20.6	68.33	15.20	20.6	18.14	20.69	20.6	41.47	26.61	20.6	26.45	38.18
21.5	5.22	55.44	21.6	68.77	15.48	21.6	18.26	21.02	21.6	41.62	26.84	21.6	26.64	38.46
22.5	5.25	55.80	22.6	69.16	15.77	22.6	18.40	21.32	22.6	41.77	27.11	22.6	26.85	38.72
23.5	5.28	56.17	23.6	69.49	16.07	23.6	18.54	21.63	23.6	41.90	27.38	23.6	27.06	38.97
24.5	5.33	56.53	24.6	69.77	16.37	24.6	18.72	21.93	24.6	42.00	27.66	24.6	27.29	39.24
25.5	5.37	56.92	25.6	70.00	16.66	25.6	18.90	22.24	25.6	42.10	27.93	25.6	27.54	39.52
26.5	5.42	57.31	26.6	70.22	16.94	26.6	19.07	22.58	26.6	42.19	28.17	26.6	27.79	39.82
27.5	5.46	57.75	27.6	70.44	17.18	27.6	19.24	22.95	27.6	42.29	28.40	27.6	28.04	40.14
28.5	5.49	58.18	28.6	70.68	17.45	28.6	19.40	23.32	28.6	42.40	28.62	28.6	28.27	40.47
29.5	5.50	58.61	29.6	70.96	17.71	29.6	19.55	23.70	29.6	42.51	28.84	29.6	28.50	40.79
30.5	5.49	59.04	30.6	71.27	17.97	30.6	19.69	24.09	30.6	42.64	29.07	30.6	28.70	41.16
31.5	5.48	59.46	31.6	71.58	18.23	31.6	19.79	24.49	31.6	42.77	29.31	31.6	28.88	41.50
9.81	-9.76		31.04	+31.02		10.77	-10.72		9.35	+9.29		12.36	-12.32	
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m 14 13	° ' -83 17	Feb.	h m 15 3	° ' +87 32	Feb.	h m 15 23	° ' -84 11	Feb.	h m 16 54	° ' +82 10	Feb.	h m 17 15	° ' -80 46
	s "	"		s "	"		s "	"		s "	"		s "	"
0.7	31.69	11.01	0.8	32.53	42.60	0.8	58.62	19.39	0.8	17.79	10.57	0.9	54.32	56.84
1.7	31.93	11.18	1.8	32.98	42.52	1.8	58.91	19.42	1.8	17.90	10.37	1.9	54.49	56.69
2.7	32.15	11.36	2.8	33.45	42.45	2.8	59.19	19.48	2.8	18.03	10.14	2.8	54.66	56.56
3.7	32.37	11.54	3.8	33.95	42.37	3.8	59.46	19.54	3.8	18.16	9.93	3.8	54.83	56.44
4.7	32.57	11.72	4.8	34.47	42.29	4.8	59.71	19.60	4.8	18.30	9.71	4.8	54.99	56.34
5.7	32.76	11.90	5.8	35.01	42.23	5.8	59.96	19.68	5.8	18.44	9.50	5.8	55.14	56.25
6.7	32.95	12.07	6.7	35.56	42.18	6.8	60.20	19.76	6.8	18.59	9.29	6.8	55.29	56.15
7.7	33.13	12.25	7.7	36.11	42.15	7.8	60.43	19.81	7.8	18.74	9.09	7.8	55.42	56.06
8.7	33.32	12.39	8.7	36.66	42.14	8.8	60.67	19.87	8.8	18.91	8.91	8.8	55.56	55.96
9.7	33.51	12.53	9.7	37.21	42.17	9.8	60.90	19.91	9.8	19.06	8.77	9.8	55.70	55.82
10.7	33.69	12.68	10.7	37.73	42.20	10.8	61.14	19.95	10.8	19.21	8.63	10.8	55.84	55.69
11.7	33.91	12.83	11.7	38.22	42.25	11.7	61.40	19.98	11.8	19.37	8.53	11.8	55.98	55.55
12.7	34.13	13.00	12.7	38.69	42.31	12.7	61.66	20.01	12.8	19.52	8.43	12.8	56.15	55.42
13.7	34.35	13.17	13.7	39.15	42.36	13.7	61.93	20.07	13.8	19.66	8.32	13.8	56.32	55.28
14.7	34.57	13.36	14.7	39.58	42.41	14.7	62.22	20.15	14.8	19.80	8.23	14.8	56.49	55.15
15.7	34.80	13.60	15.7	40.00	42.43	15.7	62.51	20.23	15.8	19.94	8.13	15.8	56.68	55.06
16.7	35.02	13.86	16.7	40.46	42.43	16.7	62.80	20.37	16.8	20.07	8.00	16.8	56.87	54.99
17.7	35.22	14.12	17.7	40.92	42.43	17.7	63.08	20.53	17.8	20.22	7.87	17.8	57.06	54.93
18.7	35.42	14.38	18.7	41.43	42.43	18.7	63.35	20.70	18.8	20.36	7.72	18.8	57.25	54.90
19.7	35.60	14.64	19.7	41.95	42.43	19.7	63.59	20.86	19.8	20.53	7.56	19.8	57.42	54.89
20.7	35.77	14.88	20.7	42.49	42.47	20.7	63.83	21.01	20.8	20.69	7.42	20.8	57.58	54.86
21.7	35.93	15.12	21.7	43.04	42.54	21.7	64.05	21.14	21.8	20.86	7.32	21.8	57.73	54.83
22.7	36.09	15.32	22.7	43.56	42.64	22.7	64.27	21.26	22.8	21.04	7.25	22.8	57.88	54.78
23.7	36.27	15.52	23.7	44.06	42.77	23.7	64.51	21.37	23.8	21.20	7.20	23.8	58.02	54.71
24.7	36.46	15.72	24.7	44.53	42.90	24.7	64.75	21.47	24.8	21.36	7.16	24.8	58.17	54.62
25.7	36.65	15.94	25.7	44.96	43.03	25.7	65.01	21.55	25.8	21.51	7.16	25.8	58.34	54.54
26.7	36.86	16.16	26.7	45.38	43.16	26.7	65.28	21.67	26.8	21.66	7.16	26.8	58.52	54.45
27.7	37.06	16.41	27.7	45.78	43.28	27.7	65.55	21.80	27.8	21.81	7.12	27.8	58.71	54.40
28.7	37.27	16.69	28.7	46.19	43.38	28.7	65.83	21.97	28.8	21.96	7.09	28.8	58.90	54.37
29.6	37.46	16.98	29.7	46.60	43.48	29.7	66.10	22.16	29.8	22.11	7.06	29.8	59.08	54.36
30.6	37.64	17.29	30.7	47.05	43.58	30.7	66.36	22.35	30.8	22.27	7.02	30.8	59.27	54.37
31.6	37.81	17.59	31.7	47.51	43.69	31.7	66.60	22.56	31.8	22.44	6.97	31.8	59.45	54.38
8.55	-8.50		23.35	+23.32		9.88	-9.83		7.34	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21".03			+87° 33' 10".52			-84° 11' 30".39			+82° 10' 32".75			-80° 47' 6".56		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursæ Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursæ Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Feb.	17 58	+86 36	Feb.	18 6	-87 39	Feb.	19 0	+89 0	Feb.	19 26	-89 13	Feb.	20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
0.9	35.82	35.26	0.9	2.23	42.49	0.9	55.64	53.50	0.9	56.28	21.99	1.0	28.03	33.63
1.9	36.01	35.01	1.9	2.79	42.25	1.9	55.97	53.22	1.9	57.39	21.64	1.9	28.02	33.31
2.9	36.20	34.74	2.9	3.35	42.03	2.9	56.32	52.93	2.9	58.56	21.30	2.9	28.00	32.99
3.9	36.42	34.46	3.9	3.90	41.83	3.9	56.71	52.61	3.9	59.74	20.98	3.9	27.99	32.66
4.9	36.64	34.18	4.9	4.42	41.63	4.9	57.14	52.28	4.9	60.91	20.70	4.9	27.98	32.32
5.9	36.88	33.91	5.9	4.95	41.44	5.9	57.63	51.95	5.9	62.05	20.42	5.9	27.97	31.98
6.9	37.15	33.64	6.9	5.46	41.27	6.9	58.21	51.63	6.9	63.14	20.14	6.9	27.97	31.61
7.9	37.42	33.39	7.9	5.94	41.09	7.9	58.85	51.33	7.9	64.19	19.86	7.9	27.98	31.25
8.9	37.72	33.14	8.9	6.42	40.90	8.9	59.57	51.03	8.9	65.20	19.58	8.9	28.00	30.89
9.9	38.02	32.91	9.9	6.89	40.71	9.9	60.34	50.75	9.9	66.18	19.30	9.9	28.03	30.54
10.9	38.32	32.71	10.9	7.37	40.48	10.9	61.15	50.48	10.9	67.17	18.99	10.9	28.07	30.20
11.9	38.62	32.52	11.9	7.87	40.26	11.9	61.95	50.24	11.9	68.19	18.67	11.9	28.11	29.87
12.9	38.92	32.34	12.9	8.40	40.04	12.9	62.74	50.00	12.9	69.28	18.34	12.9	28.15	29.58
13.8	39.20	32.19	13.9	8.97	39.82	13.9	63.47	49.79	13.9	70.48	18.00	13.9	28.20	29.29
14.8	39.47	32.05	14.9	9.58	39.59	14.9	64.16	49.58	14.9	71.81	17.67	14.9	28.23	29.02
15.8	39.72	31.86	15.8	10.23	39.39	15.9	64.78	49.35	15.9	73.26	17.35	15.9	28.27	28.75
16.8	39.96	31.68	16.8	10.88	39.21	16.9	65.38	49.11	16.9	74.82	17.07	16.9	28.30	28.47
17.8	40.22	31.48	17.8	11.55	39.07	17.9	65.97	48.86	17.9	76.42	16.79	17.9	28.33	28.15
18.8	40.49	31.25	18.8	12.21	38.94	18.9	66.62	48.59	18.9	78.01	16.54	18.9	28.35	27.84
19.8	40.79	31.02	19.8	12.82	38.84	19.9	67.35	48.32	19.9	79.53	16.31	19.9	28.38	27.50
20.8	41.11	30.82	20.8	13.40	38.73	20.9	68.19	48.04	20.9	80.97	16.09	20.9	28.42	27.15
21.8	41.45	30.62	21.8	13.96	38.60	21.9	69.13	47.79	21.9	82.30	15.86	21.9	28.47	26.80
22.8	41.81	30.47	22.8	14.48	38.47	22.9	70.14	47.54	22.9	83.57	15.61	22.9	28.52	26.46
23.8	42.17	30.33	23.8	15.03	38.33	23.9	71.17	47.33	23.9	84.82	15.34	23.9	28.60	26.16
24.8	42.51	30.23	24.8	15.58	38.15	24.9	72.22	47.14	24.9	86.10	15.07	24.9	28.69	25.88
25.8	42.86	30.14	25.8	16.18	37.97	25.9	73.24	46.97	25.9	87.45	14.77	25.9	28.77	25.61
26.8	43.18	30.05	26.8	16.80	37.80	26.9	74.20	46.81	26.9	88.91	14.48	26.9	28.85	25.37
27.8	43.49	29.96	27.8	17.46	37.65	27.9	75.11	46.64	27.9	90.49	14.20	27.9	28.93	25.13
28.8	43.80	29.86	28.8	18.14	37.50	28.9	76.00	46.48	28.9	92.15	13.92	28.9	29.01	24.88
29.8	44.11	29.76	29.8	18.83	37.39	29.8	76.87	46.31	29.9	93.86	13.68	29.9	29.07	24.61
30.8	44.42	29.62	30.8	19.50	37.31	30.8	77.75	46.12	30.9	95.59	13.46	30.9	29.14	24.34
31.8	44.74	29.49	31.8	20.16	37.25	31.8	78.67	45.92	31.9	97.30	13.26	31.9	29.21	24.05
16.91	+16.88		24.50	-24.48		58.10	+58.09		73.60	-73.59		7.39	+7.32	
17 <sup>h</sup> 59 <sup>m</sup>	1° 30'		18 <sup>h</sup> 6 <sup>m</sup>	11° 89'		19 <sup>h</sup> 2 <sup>m</sup>	39° 62'		19 <sup>h</sup> 27 <sup>m</sup>	42° 218'		20 <sup>h</sup> 48 <sup>m</sup>	40° 494'	
+86° 36'	51° 17'		-87° 39'	51° 82'		+89° 1'	2° 17'		-89° 13'	28° 57'		+82° 13'	29° 86'	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "	Feb.	h m	° ' "
	s	"		s	"		s	"		s	"		s	"
1.0	14.37	67.15	1.1	57.70	28.93	1.1	34.98	65.55	1.1	22.72	19.98	1.1	12.58	54.81
2.0	14.38	66.76	2.1	57.64	28.52	2.1	34.94	65.17	2.1	22.46	19.78	2.1	12.48	54.48
3.0	14.41	66.37	3.1	57.60	28.14	3.1	34.92	64.78	3.1	22.19	19.59	3.1	12.39	54.16
4.0	14.44	66.00	4.1	57.58	27.76	4.1	34.90	64.42	4.1	21.91	19.36	4.1	12.31	53.84
5.0	14.47	65.64	5.1	57.57	27.38	5.1	34.88	64.05	5.1	21.62	19.12	5.1	12.24	53.52
6.0	14.50	65.30	6.0	57.56	27.02	6.1	34.87	63.73	6.1	21.33	18.88	6.1	12.17	53.21
7.0	14.53	64.96	7.0	57.53	26.68	7.1	34.84	63.40	7.1	21.05	18.60	7.1	12.09	52.92
8.0	14.54	64.63	8.0	57.50	26.34	8.1	34.81	63.08	8.1	20.78	18.33	8.1	12.01	52.63
9.0	14.55	64.31	9.0	57.47	26.01	9.1	34.79	62.76	9.1	20.55	18.04	9.1	11.94	52.34
10.0	14.56	63.97	10.0	57.42	25.67	10.1	34.75	62.44	10.1	20.34	17.73	10.1	11.84	52.04
11.0	14.57	63.63	11.0	57.36	25.31	11.1	34.71	62.09	11.1	20.15	17.41	11.1	11.74	51.75
12.0	14.57	63.26	12.0	57.30	24.93	12.0	34.67	61.73	12.1	19.98	17.13	12.1	11.65	51.43
13.0	14.58	62.86	13.0	57.24	24.53	13.0	34.62	61.36	13.1	19.84	16.86	13.1	11.55	51.12
14.0	14.61	62.46	14.0	57.20	24.12	14.0	34.61	60.96	14.1	19.70	16.61	14.1	11.46	50.76
14.9	14.64	62.04	15.0	57.19	23.70	15.0	34.59	60.55	15.1	19.57	16.36	15.1	11.37	50.38
15.9	14.69	61.63	16.0	57.20	23.27	16.0	34.58	60.14	16.1	19.40	16.12	16.1	11.31	49.99
16.9	14.77	61.22	17.0	57.26	22.84	17.0	34.59	59.72	17.1	19.23	15.89	17.1	11.25	49.59
17.9	14.85	60.81	18.0	57.35	22.42	18.0	34.62	59.30	18.1	19.04	15.66	18.1	11.20	49.20
18.9	14.94	60.44	19.0	57.43	22.05	19.0	34.65	58.93	19.1	18.81	15.39	19.1	11.17	48.83
19.9	15.03	60.09	20.0	57.52	21.66	20.0	34.67	58.54	20.1	18.61	15.11	20.1	11.14	48.45
20.9	15.10	59.75	21.0	57.58	21.30	21.0	34.68	58.20	21.1	18.42	14.79	21.1	11.11	48.11
21.9	15.16	59.42	22.0	57.63	20.96	22.0	34.69	57.86	22.1	18.24	14.45	22.1	11.06	47.78
22.9	15.20	59.08	23.0	57.65	20.62	23.0	34.69	57.51	23.1	18.11	14.11	23.1	11.00	47.44
23.9	15.24	58.71	23.9	57.66	20.25	24.0	34.68	57.15	24.0	18.03	13.79	24.1	10.94	47.10
24.9	15.28	58.35	24.9	57.67	19.87	25.0	34.67	56.79	25.0	17.97	13.47	25.1	10.86	46.77
25.9	15.34	57.97	25.9	57.70	19.47	26.0	34.67	56.38	26.0	17.92	13.15	26.1	10.78	46.40
26.9	15.39	57.57	26.9	57.73	19.06	27.0	34.66	55.98	27.0	17.87	12.88	27.1	10.73	46.01
27.9	15.47	57.16	27.9	57.78	18.65	28.0	34.67	55.57	28.0	17.82	12.60	28.1	10.68	45.60
28.9	15.56	56.76	28.9	57.87	18.22	29.0	34.70	55.15	29.0	17.75	12.33	29.0	10.64	45.19
29.9	15.65	56.38	29.9	57.99	17.79	29.9	34.73	54.74	30.0	17.67	12.05	30.0	10.61	44.78
30.9	15.75	56.02	30.9	58.12	17.39	30.9	34.78	54.34	31.0	17.58	11.77	31.0	10.60	44.37
31.9	15.87	55.65	31.9	58.25	17.01	31.9	34.83	53.95	32.0	17.48	11.46	32.0	10.59	43.99
8.32	-8.26		15.88	-15.85		7.03	-6.95		18.22	+18.20		7.64	-7.58	
21 <sup>h</sup> 38 <sup>m</sup>	19°.542		22 <sup>h</sup> 16 <sup>m</sup>	8°.656		22 <sup>h</sup> 37 <sup>m</sup>	39°.016		23 <sup>h</sup> 27 <sup>m</sup>	44°.125		23 <sup>h</sup> 47 <sup>m</sup>	16°.424	
-83° 6'	6'' .99		-86° 23'	27'' .13		-81° 49'	2'' .34		+86° 50'	58'' .89		-82° 28'	48'' .42	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "
	0 56	+85 48		1 29	+88 51		1 41	-85 11		4 10	+85 20		5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.1	56.37	66.52	0.1	32.33	67.24	0.1	52.48	25.59	0.2	8.74	36.00	0.3	26.04	52.00
1.1	56.24	66.29	1.1	31.69	67.02	1.1	52.27	25.26	1.2	8.53	35.98	1.3	25.83	52.08
2.1	56.09	66.05	2.1	31.00	66.82	2.1	52.07	24.93	2.2	8.30	35.95	2.3	25.63	52.16
3.1	55.92	65.80	3.1	30.27	66.61	3.1	51.88	24.60	3.2	8.07	35.94	3.3	25.40	52.26
4.1	55.75	65.56	4.1	29.51	66.39	4.1	51.71	24.26	4.2	7.82	35.93	4.3	25.18	52.35
5.1	55.58	65.29	5.1	28.72	66.16	5.1	51.55	23.94	5.2	7.55	35.89	5.3	24.94	52.44
6.1	55.40	65.03	6.1	27.93	65.92	6.1	51.40	23.64	6.2	7.27	35.85	6.3	24.67	52.53
7.1	55.22	64.74	7.1	27.18	65.65	7.1	51.25	23.34	7.2	7.00	35.79	7.3	24.41	52.58
8.1	55.07	64.42	8.1	26.45	65.36	8.1	51.08	23.06	8.2	6.71	35.71	8.3	24.14	52.64
9.1	54.93	64.11	9.1	25.79	65.07	9.1	50.91	22.76	9.2	6.44	35.62	9.3	23.86	52.69
10.1	54.82	63.78	10.1	25.19	64.78	10.1	50.74	22.47	10.2	6.17	35.49	10.3	23.59	52.68
11.1	54.72	63.44	11.1	24.69	64.46	11.1	50.55	22.18	11.2	5.92	35.35	11.3	23.32	52.67
12.1	54.63	63.13	12.1	24.25	64.17	12.1	50.37	21.90	12.2	5.68	35.20	12.3	23.06	52.63
13.1	54.58	62.83	13.1	23.86	63.89	13.1	50.18	21.60	13.2	5.46	35.06	13.3	22.83	52.59
14.1	54.53	62.54	14.1	23.50	63.61	14.1	49.99	21.25	14.2	5.27	34.92	14.3	22.62	52.55
15.1	54.48	62.27	15.1	23.14	63.36	15.1	49.80	20.90	15.2	5.07	34.81	15.3	22.42	52.53
16.1	54.40	62.03	16.1	22.75	63.11	16.1	49.65	20.52	16.2	4.88	34.70	16.2	22.21	52.52
17.1	54.32	61.77	17.1	22.30	62.89	17.1	49.51	20.13	17.2	4.68	34.60	17.2	22.01	52.53
18.1	54.22	61.52	18.1	21.78	62.66	18.1	49.40	19.73	18.2	4.45	34.51	18.2	21.79	52.57
19.0	54.12	61.26	19.1	21.23	62.40	19.1	49.29	19.36	19.2	4.23	34.42	19.2	21.55	52.60
20.0	54.01	60.96	20.1	20.69	62.13	20.1	49.18	19.00	20.2	3.98	34.32	20.2	21.29	52.61
21.0	53.91	60.63	21.1	20.18	61.82	21.1	49.07	18.64	21.2	3.73	34.19	21.2	21.01	52.58
22.0	53.85	60.29	22.1	19.73	61.48	22.1	48.96	18.33	22.2	3.47	34.01	22.2	20.74	52.53
23.0	53.79	59.92	23.1	19.40	61.14	23.1	48.83	18.00	23.2	3.22	33.78	23.2	20.47	52.44
24.0	53.78	59.58	24.1	19.15	60.79	24.1	48.68	17.69	24.2	3.01	33.57	24.2	20.23	52.34
25.0	53.77	59.25	25.1	19.00	60.45	25.1	48.54	17.38	25.2	2.81	33.35	25.2	19.98	52.23
26.0	53.78	58.93	26.1	18.89	60.13	26.1	48.39	17.04	26.2	2.63	33.15	26.2	19.75	52.11
27.0	53.79	58.65	27.1	18.79	59.85	27.1	48.24	16.66	27.2	2.46	32.94	27.2	19.56	52.00
28.0	53.82	58.37	28.0	18.67	59.58	28.1	48.10	16.27	28.2	2.29	32.76	28.2	19.35	51.90
29.0	53.83	58.09	29.0	18.51	59.30	29.1	48.01	15.88	29.2	2.13	32.58	29.2	19.15	51.81
30.0	53.82	57.81	30.0	18.31	59.03	30.0	47.91	15.47	30.2	1.96	32.43	30.2	18.95	51.76
31.0	53.79	57.53	31.0	18.08	58.77	31.0	47.85	15.07	31.2	1.77	32.26	31.2	18.72	51.69
13.71	+13.67		50.60	+50.59		11.92	-11.88		12.32	+12.28		11.86	+11.82	
0 <sup>h</sup> 57 <sup>m</sup>	9° 30'00"		1 <sup>h</sup> 30 <sup>m</sup>	13° 15'56"		1 <sup>h</sup> 42 <sup>m</sup>	2° 33'39"		4 <sup>h</sup> 10 <sup>m</sup>	2° 56'11"		5 <sup>h</sup> 35 <sup>m</sup>	12° 7'82"	
+85° 48'	45'' 30"		+88° 51'	43'' 55"		-85° 11'	21'' 46"		+85° 20'	10'' 34"		+85° 9'	30'' 24"	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			ζ Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Ootantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 5 46	° ' -84 50	Mar.	h m 6 46	° ' -80 43	Mar.	h m 7 2	° ' +87 11	Mar.	h m 7 13	° ' +82 34	Mar.	h m 7 16	° ' -86 54
	s "	"		s "	"		s "	"		s "	"		s "	"
0.3	13.43	1.76	0.3	60.13	54.00	0.4	35.56	9.73	0.4	55.60	43.28	0.4	24.11	21.82
1.3	13.14	1.87	1.3	59.98	54.20	1.4	35.27	9.90	1.4	55.49	43.45	1.4	23.68	22.06
2.3	12.84	1.93	2.3	59.83	54.39	2.3	34.98	10.08	2.4	55.40	43.64	2.4	23.24	22.30
3.3	12.54	1.99	3.3	59.69	54.54	3.3	34.67	10.26	3.4	55.29	43.84	3.4	22.81	22.49
4.3	12.26	2.02	4.3	59.54	54.69	4.3	34.35	10.46	4.4	55.17	44.05	4.4	22.39	22.68
5.3	11.97	2.05	5.3	59.40	54.83	5.3	34.01	10.66	5.3	55.05	44.25	5.3	21.96	22.85
6.3	11.70	2.08	6.3	59.26	54.95	6.3	33.64	10.86	6.3	54.92	44.45	6.3	21.55	23.01
7.3	11.44	2.11	7.3	59.11	55.08	7.3	33.23	11.06	7.3	54.78	44.66	7.3	21.15	23.18
8.3	11.17	2.14	8.3	58.98	55.20	8.3	32.82	11.24	8.3	54.63	44.85	8.3	20.76	23.35
9.3	10.91	2.18	9.3	58.84	55.33	9.3	32.39	11.39	9.3	54.47	45.01	9.3	20.38	23.53
10.3	10.64	2.23	10.3	58.70	55.49	10.3	31.96	11.53	10.3	54.31	45.16	10.3	20.01	23.72
11.3	10.38	2.32	11.3	58.56	55.64	11.3	31.53	11.65	11.3	54.15	45.31	11.3	19.62	23.92
12.3	10.10	2.38	12.3	58.43	55.80	12.3	31.11	11.75	12.3	53.99	45.41	12.3	19.21	24.13
13.3	9.81	2.45	13.3	58.28	55.96	13.3	30.72	11.82	13.3	53.85	45.50	13.3	18.79	24.34
14.3	9.51	2.50	14.3	58.13	56.12	14.3	30.35	11.89	14.3	53.72	45.59	14.3	18.35	24.55
15.3	9.20	2.52	15.3	57.97	56.27	15.3	30.01	11.97	15.3	53.59	45.68	15.3	17.88	24.75
16.3	8.88	2.53	16.3	57.81	56.38	16.3	29.68	12.07	16.3	53.48	45.79	16.3	17.39	24.91
17.3	8.57	2.51	17.3	57.65	56.47	17.3	29.35	12.18	17.3	53.36	45.91	17.3	16.89	25.06
18.3	8.28	2.47	18.3	57.49	56.53	18.3	29.00	12.30	18.3	53.24	46.04	18.3	16.40	25.18
19.2	7.99	2.41	19.3	57.33	56.59	19.3	28.64	12.43	19.3	53.11	46.18	19.3	15.93	25.28
20.2	7.71	2.35	20.3	57.17	56.63	20.3	28.22	12.56	20.3	52.96	46.32	20.3	15.47	25.37
21.2	7.45	2.31	21.3	57.02	56.68	21.3	27.77	12.67	21.3	52.79	46.44	21.3	15.04	25.47
22.2	7.18	2.28	22.3	56.88	56.74	22.3	27.31	12.75	22.3	52.62	46.54	22.3	14.63	25.58
23.2	6.92	2.27	23.3	56.74	56.83	23.3	26.84	12.81	23.3	52.44	46.60	23.3	14.22	25.71
24.2	6.64	2.28	24.3	56.59	56.94	24.3	26.37	12.84	24.3	52.27	46.65	24.3	13.80	25.85
25.2	6.37	2.28	25.3	56.45	57.04	25.3	25.94	12.85	25.3	52.11	46.68	25.3	13.37	26.01
26.2	6.08	2.29	26.3	56.30	57.15	26.3	25.52	12.83	26.3	51.96	46.71	26.3	12.92	26.16
27.2	5.79	2.28	27.3	56.13	57.24	27.3	25.13	12.82	27.3	51.81	46.72	27.3	12.45	26.30
28.2	5.47	2.24	28.3	55.97	57.30	28.3	24.76	12.84	28.3	51.68	46.75	28.3	11.96	26.43
29.2	5.18	2.19	29.3	55.81	57.35	29.3	24.39	12.87	29.3	51.54	46.78	29.3	11.46	26.53
30.2	4.89	2.11	30.3	55.64	57.37	30.3	24.02	12.90	30.3	51.41	46.82	30.3	10.97	26.61
31.2	4.60	2.01	31.3	55.48	57.38	31.3	23.63	12.94	31.3	51.27	46.88	31.3	10.47	26.67
11.11	-11.06		6.21	-6.13		20.37	+20.35		7.74	+7.68		18.53	-18.51	
5 <sup>h</sup> 46 <sup>m</sup>	14°.756		6 <sup>h</sup> 46 <sup>m</sup>	58°.546		7 <sup>h</sup> 2 <sup>m</sup>	4°.048		7 <sup>h</sup> 13 <sup>m</sup>	42°.294		7 <sup>h</sup> 16 <sup>m</sup>	20°.292	
-84° 49'	46''.89		-80° 43'	38''.16		+87° 10'	54''.74		+82° 34'	30''.13		-86° 54'	6''.70	



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "	Mar.	h m	° ' "
	8 16	+88 53		9 9	-85 20		9 25	+81 41		9 36	-80 34		10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
0.4	78.41	7.70	0.4	6.50	10.20	0.5	35.65	39.94	0.5	27.98	19.08	0.5	20.55	46.29
1.4	77.89	7.94	1.4	6.35	10.58	1.5	35.62	40.19	1.5	27.94	19.48	1.5	20.55	46.56
2.4	77.38	8.21	2.4	6.18	10.95	2.5	35.60	40.47	2.5	27.88	19.86	2.5	20.57	46.84
3.4	76.87	8.46	3.4	6.01	11.29	3.4	35.58	40.75	3.5	27.82	20.24	3.5	20.58	47.15
4.4	76.30	8.73	4.4	5.82	11.62	4.4	35.56	41.06	4.5	27.75	20.60	4.5	20.58	47.46
5.4	75.68	9.02	5.4	5.65	11.93	5.4	35.52	41.37	5.4	27.68	20.93	5.5	20.59	47.77
6.4	75.01	9.30	6.4	5.48	12.23	6.4	35.48	41.69	6.4	27.61	21.26	6.5	20.57	48.11
7.4	74.28	9.57	7.4	5.30	12.52	7.4	35.42	42.00	7.4	27.54	21.59	7.5	20.54	48.44
8.4	73.47	9.82	8.4	5.15	12.81	8.4	35.35	42.31	8.4	27.48	21.90	8.5	20.52	48.78
9.4	72.60	10.07	9.4	5.00	13.12	9.4	35.27	42.60	9.4	27.41	22.21	9.5	20.47	49.12
10.4	71.71	10.30	10.4	4.84	13.44	10.4	35.19	42.89	10.4	27.35	22.54	10.5	20.41	49.44
11.4	70.79	10.49	11.4	4.69	13.77	11.4	35.10	43.17	11.4	27.30	22.91	11.5	20.34	49.76
12.4	69.88	10.68	12.4	4.54	14.12	12.4	35.01	43.42	12.4	27.25	23.28	12.5	20.28	50.04
13.4	69.02	10.85	13.4	4.38	14.48	13.4	34.93	43.65	13.4	27.18	23.65	13.5	20.22	50.32
14.4	68.22	10.99	14.4	4.20	14.84	14.4	34.86	43.86	14.4	27.11	24.04	14.5	20.16	50.56
15.4	67.46	11.16	15.4	4.01	15.18	15.4	34.80	44.09	15.4	27.03	24.42	15.5	20.11	50.81
16.4	66.79	11.34	16.4	3.79	15.52	16.4	34.75	44.32	16.4	26.96	24.79	16.4	20.07	51.06
17.4	66.11	11.53	17.4	3.56	15.84	17.4	34.69	44.55	17.4	26.87	25.13	17.4	20.04	51.32
18.4	65.41	11.73	18.4	3.32	16.12	18.4	34.64	44.81	18.4	26.77	25.45	18.4	20.01	51.60
19.4	64.64	11.95	19.4	3.09	16.39	19.4	34.57	45.09	19.4	26.67	25.74	19.4	19.98	51.92
20.4	63.79	12.17	20.4	2.85	16.65	20.4	34.49	45.36	20.4	26.57	26.02	20.4	19.93	52.23
21.3	62.83	12.40	21.4	2.64	16.90	21.4	34.40	45.61	21.4	26.48	26.29	21.4	19.85	52.54
22.3	61.82	12.58	22.4	2.44	17.16	22.4	34.30	45.89	22.4	26.40	26.58	22.4	19.77	52.84
23.3	60.74	12.74	23.4	2.25	17.42	23.4	34.18	46.13	23.4	26.32	26.86	23.4	19.67	53.13
24.3	59.66	12.88	24.4	2.07	17.73	24.4	34.05	46.35	24.4	26.24	27.18	24.4	19.56	53.42
25.3	58.61	12.97	25.4	1.88	18.04	25.4	33.95	46.55	25.4	26.17	27.51	25.4	19.46	53.67
26.3	57.61	13.07	26.4	1.69	18.35	26.4	33.84	46.73	26.4	26.09	27.85	26.4	19.35	53.91
27.3	56.66	13.16	27.4	1.47	18.65	27.4	33.74	46.90	27.4	26.00	28.18	27.4	19.26	54.13
28.3	55.76	13.26	28.4	1.23	18.94	28.4	33.65	47.06	28.4	25.91	28.51	28.4	19.17	54.35
29.3	54.88	13.38	29.4	0.99	19.22	29.4	33.55	47.24	29.4	25.81	28.81	29.4	19.09	54.57
30.3	54.01	13.50	30.4	0.72	19.49	30.4	33.47	47.43	30.4	25.70	29.10	30.4	19.02	54.82
31.3	53.12	13.62	31.4	0.46	19.72	31.4	33.38	47.63	31.4	25.59	29.37	31.4	18.94	55.08
51.46	+51.45		12.30	-12.26		6.92	+6.85		6.11	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0''.29			-85° 19' 57''.45			+81° 41' 41''.50			-80° 34' 6''.83			+82° 58' 54''.07		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\eta$ Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			$\iota$ Octantis. Mag. 5.4			32 H. Camelopard. seq. Mag. 5.3			$\kappa$ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 11 0	° -84 8	Mar.	h m 12 15	° +88 9	Mar.	h m 12 46	° -84 40	Mar.	h m 12 48	° +83 51	Mar.	h m 13 27	° -85 21
	s "	"		s "	"		s "	"		s "	"		s "	"
0.5	5.49	58.18	0.6	10.68	17.45	0.6	19.40	23.32	0.6	42.40	28.62	0.6	28.27	40.47
1.5	5.50	58.61	1.6	10.96	17.71	1.6	19.55	23.70	1.6	42.51	28.84	1.6	28.50	40.79
2.5	5.49	59.04	2.6	11.27	17.97	2.6	19.69	24.09	2.6	42.64	29.07	2.6	28.70	41.16
3.5	5.48	59.46	3.6	11.58	18.23	3.6	19.79	24.49	3.6	42.77	29.31	3.6	28.88	41.50
4.5	5.45	59.85	4.6	11.89	18.50	4.6	19.90	24.86	4.6	42.89	29.57	4.6	29.06	41.85
5.5	5.42	60.23	5.6	12.21	18.80	5.6	20.00	25.22	5.6	43.01	29.84	5.6	29.21	42.19
6.5	5.39	60.61	6.6	12.49	19.11	6.6	20.08	25.57	6.6	43.12	30.12	6.6	29.35	42.53
7.5	5.36	60.97	7.6	12.74	19.43	7.6	20.17	25.91	7.6	43.23	30.43	7.6	29.51	42.84
8.5	5.35	61.32	8.5	12.95	19.76	8.6	20.26	26.25	8.6	43.32	30.75	8.6	29.66	43.14
9.5	5.33	61.69	9.5	13.13	20.10	9.6	20.36	26.58	9.6	43.40	31.08	9.6	29.81	43.44
10.5	5.33	62.05	10.5	13.25	20.46	10.6	20.47	26.91	10.6	43.47	31.40	10.6	29.98	43.73
11.5	5.32	62.42	11.5	13.35	20.79	11.6	20.60	27.27	11.6	43.53	31.72	11.6	30.18	44.04
12.5	5.31	62.83	12.5	13.39	21.11	12.6	20.72	27.63	12.6	43.58	32.02	12.6	30.37	44.36
13.5	5.31	63.24	13.5	13.44	21.41	13.6	20.84	28.00	13.6	43.63	32.31	13.6	30.57	44.72
14.5	5.30	63.66	14.5	13.48	21.69	14.6	20.96	28.39	14.6	43.68	32.60	14.6	30.77	45.08
15.5	5.26	64.08	15.5	13.57	21.97	15.6	21.07	28.81	15.6	43.73	32.84	15.6	30.95	45.47
16.5	5.22	64.51	16.5	13.67	22.25	16.5	21.17	29.23	16.5	43.79	33.10	16.6	31.10	45.86
17.5	5.15	64.94	17.5	13.81	22.51	17.5	21.23	29.66	17.5	43.88	33.35	17.6	31.24	46.26
18.5	5.07	65.34	18.5	13.98	22.79	18.5	21.29	30.05	18.5	43.96	33.62	18.6	31.36	46.65
19.5	4.99	65.72	19.5	14.14	23.11	19.5	21.33	30.44	19.5	44.03	33.91	19.6	31.47	47.03
20.5	4.91	66.06	20.5	14.26	23.43	20.5	21.36	30.82	20.5	44.09	34.23	20.6	31.56	47.39
21.5	4.85	66.41	21.5	14.33	23.77	21.5	21.40	31.18	21.5	44.15	34.56	21.6	31.65	47.73
22.5	4.79	66.75	22.5	14.34	24.11	22.5	21.45	31.52	22.5	44.19	34.91	22.6	31.76	48.07
23.5	4.73	67.11	23.5	14.29	24.48	23.5	21.51	31.87	23.5	44.20	35.26	23.6	31.89	48.40
24.5	4.69	67.47	24.5	14.19	24.82	24.5	21.60	32.23	24.5	44.21	35.60	24.6	32.03	48.73
25.5	4.65	67.83	25.5	14.06	25.14	25.5	21.68	32.61	25.5	44.21	35.93	25.6	32.18	49.08
26.4	4.61	68.22	26.5	13.94	25.43	26.5	21.77	33.00	26.5	44.20	36.23	26.5	32.33	49.44
27.4	4.56	68.62	27.5	13.83	25.72	27.5	21.84	33.41	27.5	44.20	36.52	27.5	32.48	49.83
28.4	4.48	69.01	28.5	13.74	26.01	28.5	21.90	33.82	28.5	44.20	36.81	28.5	32.61	50.22
29.4	4.40	69.41	29.5	13.68	26.29	29.5	21.95	34.23	29.5	44.22	37.10	29.5	32.71	50.63
30.4	4.29	69.80	30.5	13.63	26.56	30.5	21.96	34.65	30.5	44.24	37.37	30.5	32.81	51.04
31.4	4.19	70.16	31.5	13.59	26.87	31.5	21.97	35.04	31.5	44.26	37.66	31.5	32.87	51.43
9.81	-9.76		31.08	+31.06		10.77	-10.73		9.35	+9.29		12.37	-12.33	
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Mar.	14 13	-83 17	Mar.	15 3	+87 32	Mar.	15 24	-84 11	Mar.	16 54	+82 10	Mar.	17 15	-80 46
	s	"		s	"		s	"		s	"		s	"
0.7	37.27	16.69	0.7	46.19	43.38	0.7	5.83	21.97	0.8	21.96	7.09	0.8	58.90	54.37
1.6	37.46	16.98	1.7	46.60	43.48	1.7	6.10	22.16	1.8	22.11	7.06	1.8	59.08	54.36
2.6	37.64	17.29	2.7	47.05	43.58	2.7	6.36	22.35	2.8	22.27	7.02	2.8	59.27	54.37
3.6	37.81	17.59	3.7	47.51	43.69	3.7	6.60	22.56	3.8	22.44	6.97	3.8	59.45	54.38
4.6	37.96	17.88	4.7	47.98	43.81	4.7	6.83	22.77	4.8	22.60	6.93	4.8	59.62	54.42
5.6	38.10	18.19	5.7	48.48	43.94	5.7	7.05	22.97	5.8	22.77	6.88	5.8	59.78	54.45
6.6	38.25	18.47	6.7	48.96	44.09	6.7	7.25	23.18	6.7	22.94	6.87	6.8	59.95	54.49
7.6	38.38	18.75	7.7	49.45	44.25	7.7	7.46	23.37	7.7	23.11	6.86	7.8	60.09	54.52
8.6	38.53	19.02	8.7	49.93	44.43	8.7	7.67	23.55	8.7	23.28	6.87	8.8	60.24	54.53
9.6	38.67	19.27	9.7	50.38	44.62	9.7	7.88	23.71	9.7	23.45	6.91	9.8	60.39	54.54
10.6	38.81	19.52	10.7	50.81	44.84	10.7	8.09	23.87	10.7	23.62	6.97	10.8	60.54	54.53
11.6	38.99	19.78	11.7	51.20	45.06	11.7	8.32	24.04	11.7	23.77	7.05	11.7	60.71	54.52
12.6	39.15	20.05	12.7	51.56	45.28	12.7	8.56	24.21	12.7	23.92	7.13	12.7	60.88	54.51
13.6	39.32	20.33	13.7	51.90	45.49	13.7	8.81	24.40	13.7	24.07	7.22	13.7	61.06	54.50
14.6	39.50	20.65	14.6	52.22	45.69	14.7	9.07	24.62	14.7	24.22	7.30	14.7	61.25	54.50
15.6	39.68	20.98	15.6	52.56	45.87	15.7	9.33	24.85	15.7	24.37	7.35	15.7	61.43	54.55
16.6	39.83	21.34	16.6	52.90	46.02	16.7	9.57	25.12	16.7	24.50	7.40	16.7	61.63	54.62
17.6	39.97	21.70	17.6	53.27	46.18	17.7	9.80	25.40	17.7	24.66	7.43	17.7	61.81	54.70
18.6	40.11	22.06	18.6	53.68	46.35	18.7	10.00	25.68	18.7	24.80	7.46	18.7	61.99	54.80
19.6	40.21	22.40	19.6	54.09	46.52	19.7	10.20	25.94	19.7	24.98	7.50	19.7	62.16	54.91
20.6	40.32	22.74	20.6	54.50	46.73	20.6	10.38	26.20	20.7	25.14	7.56	20.7	62.31	55.02
21.6	40.42	23.04	21.6	54.89	46.96	21.6	10.56	26.44	21.7	25.30	7.65	21.7	62.45	55.10
22.6	40.53	23.34	22.6	55.27	47.24	22.6	10.75	26.66	22.7	25.47	7.77	22.7	62.60	55.15
23.6	40.66	23.62	23.6	55.60	47.52	23.6	10.93	26.85	23.7	25.61	7.91	23.7	62.74	55.20
24.6	40.80	23.92	24.6	55.89	47.80	24.6	11.16	27.06	24.7	25.76	8.09	24.7	62.91	55.24
25.6	40.94	24.23	25.6	56.16	48.07	25.6	11.37	27.29	25.7	25.91	8.26	25.7	63.08	55.28
26.6	41.09	24.54	26.6	56.40	48.34	26.6	11.60	27.53	26.7	26.05	8.43	26.7	63.26	55.33
27.6	41.24	24.89	27.6	56.64	48.59	27.6	11.82	27.79	27.7	26.17	8.57	27.7	63.44	55.41
28.6	41.37	25.25	28.6	56.90	48.82	28.6	12.05	28.06	28.7	26.31	8.72	28.7	63.62	55.50
29.6	41.50	25.62	29.6	57.17	49.06	29.6	12.25	28.35	29.7	26.44	8.84	29.7	63.81	55.62
30.6	41.60	25.99	30.6	57.43	49.28	30.6	12.45	28.65	30.7	26.58	8.96	30.7	63.98	55.75
31.6	41.70	26.36	31.6	57.73	49.51	31.6	12.62	28.96	31.7	26.72	9.09	31.7	64.14	55.89
8.56	-8.50		23.36	+23.33		9.88	-9.83		7.34	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21".03			+87° 33' 10".52			-84° 11' 30".39			+82° 10' 32".75			-80° 47' 6".56		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursae Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursae Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m 17 58 s	° ' +86 36 "	Mar.	h m 18 6 s	° ' -87 39 "	Mar.	h m 19 1 s	° ' +89 0 "	Mar.	h m 19 27 s	° ' -89 13 "	Mar.	h m 20 48 s	° ' +82 13 "
0.8	43.80	29.86	0.8	18.14	37.50	0.9	16.00	46.48	0.9	32.15	13.92	0.9	29.01	24.88
1.8	44.11	29.76	1.8	18.83	37.39	1.8	16.87	46.31	1.9	33.86	13.68	1.9	29.07	24.61
2.8	44.42	29.62	2.8	19.50	37.31	2.8	17.75	46.12	2.9	35.59	13.46	2.9	29.14	24.34
3.8	44.74	29.49	3.8	20.16	37.25	3.8	18.67	45.92	3.9	37.30	13.26	3.9	29.21	24.05
4.8	45.08	29.39	4.8	20.80	37.18	4.8	19.65	45.71	4.9	38.99	13.07	4.9	29.29	23.75
5.8	45.44	29.26	5.8	21.41	37.13	5.8	20.70	45.52	5.9	40.62	12.88	5.9	29.37	23.44
6.8	45.81	29.14	6.8	22.01	37.08	6.8	21.80	45.33	6.9	42.20	12.70	6.9	29.45	23.13
7.8	46.20	29.04	7.8	22.59	37.02	7.8	22.96	45.14	7.9	43.72	12.53	7.9	29.54	22.83
8.8	46.59	28.97	8.8	23.16	36.95	8.8	24.17	44.98	8.8	45.19	12.33	8.9	29.64	22.55
9.8	46.97	28.92	9.8	23.73	36.87	9.8	25.42	44.83	9.8	46.65	12.13	9.9	29.75	22.29
10.8	47.37	28.88	10.8	24.32	36.78	10.8	26.67	44.72	10.8	48.13	11.90	10.9	29.87	22.03
11.8	47.74	28.87	11.8	24.91	36.67	11.8	27.90	44.61	11.8	49.65	11.68	11.9	29.99	21.79
12.8	48.11	28.86	12.8	25.55	36.57	12.8	29.08	44.52	12.8	51.26	11.46	12.9	30.12	21.59
13.8	48.45	28.86	13.8	26.23	36.48	13.8	30.20	44.45	13.8	52.96	11.23	13.9	30.22	21.39
14.8	48.78	28.87	14.8	26.92	36.41	14.8	31.25	44.39	14.8	54.79	11.02	14.9	30.33	21.21
15.8	49.10	28.86	15.8	27.63	36.35	15.8	32.25	44.30	15.8	56.72	10.82	15.9	30.45	21.01
16.8	49.41	28.82	16.8	28.37	36.33	16.8	33.22	44.19	16.8	58.70	10.64	16.9	30.54	20.80
17.8	49.74	28.77	17.8	29.09	36.33	17.8	34.22	44.06	17.8	60.68	10.50	17.9	30.64	20.58
18.8	50.08	28.72	18.8	29.76	36.35	18.8	35.28	43.93	18.8	62.61	10.37	18.9	30.74	20.34
19.8	50.44	28.67	19.8	30.42	36.36	19.8	36.42	43.80	19.8	64.46	10.25	19.9	30.85	20.10
20.8	50.82	28.63	20.8	31.03	36.39	20.8	37.64	43.68	20.8	66.18	10.13	20.9	30.97	19.85
21.8	51.21	28.63	21.8	31.61	36.40	21.8	38.94	43.58	21.8	67.83	10.01	21.9	31.10	19.61
22.7	51.61	28.67	22.8	32.18	36.38	22.8	40.28	43.52	22.8	69.43	9.88	22.9	31.23	19.40
23.7	52.00	28.71	23.8	32.78	36.34	23.8	41.63	43.48	23.8	71.01	9.72	23.9	31.38	19.21
24.7	52.38	28.80	24.7	33.38	36.30	24.8	42.94	43.47	24.8	72.67	9.55	24.9	31.52	19.06
25.7	52.72	28.88	25.7	34.04	36.26	25.8	44.18	43.46	25.8	74.41	9.38	25.9	31.68	18.90
26.7	53.06	28.97	26.7	34.72	36.22	26.8	45.36	43.46	26.8	76.24	9.21	26.9	31.82	18.76
27.7	53.40	29.03	27.7	35.42	36.21	27.8	46.48	43.45	27.8	78.17	9.06	27.9	31.96	18.63
28.7	53.71	29.10	28.7	36.12	36.22	28.8	47.57	43.44	28.8	80.14	8.92	28.9	32.10	18.51
29.7	54.04	29.16	29.7	36.82	36.26	29.8	48.67	43.42	29.8	82.15	8.82	29.8	32.22	18.37
30.7	54.37	29.20	30.7	37.49	36.32	30.8	49.78	43.38	30.8	84.14	8.73	30.8	32.34	18.22
31.7	54.71	29.25	31.7	38.16	36.38	31.8	50.93	43.34	31.8	86.08	8.64	31.8	32.48	18.05
16.90	+16.87		24.49	-24.47		58.01	+58.00		73.43	-73.42		7.39	+7.32	
17 <sup>h</sup> 59 <sup>m</sup>	1° 30'7"		18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36'	51° 17'		-87° 39'	51° 82'		+89° 1'	2° 17'		-89° 13'	28° 57'		+82° 13'	29° 86'	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	° ' "	Mar.	h m s	° ' "
	21 38	-83 5		22 15	-86 23		22 37	-81 48		23 27	+86 51		23 47	-82 28
0.9	15.56	56.76	0.9	57.87	18.22	1.0	34.70	55.15	1.0	17.75	12.33	1.0	10.64	45.19
1.9	15.65	56.38	1.9	57.99	17.79	1.9	34.73	54.74	2.0	17.67	12.05	2.0	10.61	44.78
2.9	15.75	56.02	2.9	58.12	17.39	2.9	34.78	54.34	3.0	17.58	11.77	3.0	10.60	44.37
3.9	15.87	55.65	3.9	58.25	17.01	3.9	34.83	53.95	4.0	17.48	11.46	4.0	10.59	43.99
4.9	15.98	55.32	4.9	58.38	16.65	4.9	34.87	53.57	5.0	17.39	11.15	5.0	10.58	43.60
5.9	16.08	54.99	5.9	58.52	16.29	5.9	34.92	53.21	6.0	17.29	10.81	6.0	10.57	43.23
6.9	16.18	54.67	6.9	58.65	15.96	6.9	34.96	52.87	7.0	17.22	10.47	7.0	10.56	42.87
7.9	16.28	54.36	7.9	58.75	15.62	7.9	35.01	52.53	8.0	17.17	10.13	8.0	10.54	42.52
8.9	16.37	54.05	8.9	58.86	15.28	8.9	35.04	52.18	9.0	17.14	9.77	9.0	10.51	42.18
9.9	16.45	53.73	9.9	58.96	14.93	9.9	35.07	51.82	10.0	17.14	9.42	10.0	10.49	41.84
10.9	16.53	53.39	10.9	59.05	14.57	10.9	35.09	51.46	11.0	17.17	9.08	11.0	10.46	41.48
11.9	16.61	53.05	11.9	59.14	14.21	11.9	35.11	51.10	12.0	17.22	8.75	12.0	10.43	41.11
12.9	16.70	52.68	12.9	59.23	13.81	12.9	35.14	50.72	13.0	17.28	8.45	13.0	10.40	40.72
13.9	16.80	52.32	13.9	59.36	13.41	13.9	35.18	50.30	13.9	17.35	8.14	14.0	10.37	40.31
14.9	16.92	51.94	14.9	59.50	13.00	14.9	35.23	49.88	14.9	17.40	7.86	15.0	10.37	39.87
15.9	17.05	51.56	15.9	59.68	12.60	15.9	35.31	49.47	15.9	17.44	7.60	16.0	10.38	39.44
16.9	17.20	51.19	16.9	59.89	12.19	16.9	35.39	49.07	16.9	17.45	7.32	17.0	10.40	39.01
17.9	17.36	50.85	17.9	60.13	11.81	17.9	35.48	48.67	17.9	17.45	7.03	18.0	10.43	38.58
18.9	17.51	50.53	18.9	60.35	11.47	18.9	35.56	48.29	18.9	17.45	6.72	19.0	10.47	38.17
19.9	17.66	50.25	19.9	60.56	11.13	19.9	35.65	47.95	19.9	17.45	6.41	19.9	10.50	37.78
20.9	17.79	49.97	20.9	60.76	10.80	20.9	35.72	47.62	20.9	17.49	6.08	20.9	10.53	37.42
21.9	17.92	49.69	21.9	60.94	10.48	21.9	35.78	47.30	21.9	17.55	5.73	21.9	10.55	37.08
22.9	18.02	49.40	22.9	61.09	10.16	22.9	35.84	46.96	22.9	17.64	5.39	22.9	10.55	36.73
23.9	18.13	49.08	23.9	61.24	9.82	23.9	35.90	46.62	23.9	17.78	5.05	23.9	10.55	36.37
24.9	18.24	48.75	24.9	61.39	9.46	24.9	35.96	46.26	24.9	17.93	4.73	24.9	10.55	36.00
25.9	18.36	48.40	25.9	61.55	9.09	25.9	36.00	45.88	25.9	18.09	4.45	25.9	10.55	35.59
26.9	18.49	48.06	26.9	61.73	8.72	26.9	36.08	45.49	26.9	18.24	4.17	26.9	10.56	35.19
27.9	18.64	47.73	27.9	61.95	8.35	27.9	36.16	45.10	27.9	18.39	3.90	27.9	10.59	34.78
28.9	18.81	47.40	28.9	62.19	7.97	28.9	36.24	44.72	28.9	18.53	3.64	28.9	10.62	34.35
29.9	18.98	47.08	29.9	62.43	7.62	29.9	36.34	44.34	29.9	18.66	3.38	29.9	10.67	33.94
30.9	19.15	46.78	30.9	62.69	7.29	30.9	36.45	43.99	30.9	18.76	3.10	30.9	10.73	33.53
31.9	19.32	46.51	31.9	62.96	6.95	31.9	36.56	43.65	31.9	18.87	2.81	31.9	10.79	33.14
8.32 -8.26			15.87 -15.84			7.02 -6.95			18.21 +18.18			7.64 -7.57		
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6''.99			-86° 23' 27''.13			-81° 49' 2''.34			+86° 50' 58''.89			-82° 28' 48''.42		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	s		h m	s		h m	s		h m	s		h m	s
Apr. 0 56		+85 48	Apr. 1 29		+88 51	Apr. 1 41		-85 11	Apr. 4 9		+85 20	Apr. 5 35		+85 9
	s	"		s	"		s	"		s	"		s	"
0.0	53.79	57.53	0.0	18.08	58.77	0.0	47.85	15.07	0.2	61.77	32.26	0.2	18.72	51.69
1.0	53.76	57.21	1.0	17.83	58.48	1.0	47.78	14.68	1.1	61.57	32.08	1.2	18.50	51.62
2.0	53.75	56.90	2.0	17.57	58.15	2.0	47.72	14.30	2.1	61.37	31.89	2.2	18.26	51.54
3.0	53.73	56.58	3.0	17.33	57.84	3.0	47.65	13.93	3.1	61.16	31.70	3.2	18.02	51.45
4.0	53.71	56.25	4.0	17.14	57.52	4.0	47.60	13.58	4.1	60.95	31.48	4.2	17.77	51.35
5.0	53.72	55.90	5.0	16.99	57.15	5.0	47.54	13.25	5.1	60.74	31.25	5.2	17.51	51.22
5.9	53.75	55.55	6.0	16.91	56.80	6.0	47.46	12.92	6.1	60.54	31.01	6.2	17.26	51.07
6.9	53.79	55.22	7.0	16.92	56.45	7.0	47.38	12.59	7.1	60.35	30.75	7.2	17.02	50.89
7.9	53.86	54.88	8.0	16.99	56.11	8.0	47.29	12.24	8.1	60.19	30.47	8.2	16.78	50.72
8.9	53.95	54.56	9.0	17.15	55.78	9.0	47.20	11.87	9.1	60.04	30.20	9.2	16.58	50.53
9.9	54.04	54.25	10.0	17.34	55.46	10.0	47.11	11.51	10.1	59.93	29.94	10.2	16.40	50.33
10.9	54.14	53.97	11.0	17.54	55.16	11.0	47.03	11.11	11.1	59.82	29.69	11.2	16.22	50.15
11.9	54.24	53.71	12.0	17.71	54.89	12.0	46.97	10.70	12.1	59.72	29.44	12.2	16.07	49.96
12.9	54.32	53.46	13.0	17.84	54.62	13.0	46.92	10.29	13.1	59.61	29.22	13.2	15.90	49.81
13.9	54.38	53.20	14.0	17.92	54.36	14.0	46.91	9.86	14.1	59.48	29.01	14.2	15.73	49.69
14.9	54.43	52.93	14.9	17.94	54.08	15.0	46.91	9.45	15.1	59.35	28.81	15.2	15.56	49.56
15.9	54.48	52.65	15.9	17.95	53.80	16.0	46.90	9.04	16.1	59.21	28.58	16.2	15.36	49.43
16.9	54.52	52.36	16.9	17.98	53.49	17.0	46.90	8.66	17.1	59.05	28.35	17.2	15.14	49.27
17.9	54.58	52.04	17.9	18.06	53.16	17.9	46.91	8.33	18.1	58.89	28.09	18.2	14.92	49.08
18.9	54.67	51.71	18.9	18.24	52.82	18.9	46.88	7.98	19.1	58.74	27.79	19.2	14.72	48.88
19.9	54.80	51.38	19.9	18.53	52.46	19.9	46.85	7.64	20.1	58.61	27.47	20.2	14.51	48.64
20.9	54.95	51.06	20.9	18.89	52.13	20.9	46.82	7.29	21.1	58.51	27.14	21.2	14.31	48.37
21.9	55.11	50.78	21.9	19.35	51.82	21.9	46.78	6.92	22.1	58.44	26.82	22.1	14.16	48.12
22.9	55.28	50.50	22.9	19.81	51.52	22.9	46.74	6.55	23.1	58.38	26.50	23.1	14.01	47.88
23.9	55.45	50.25	23.9	20.27	51.25	23.9	46.72	6.17	24.1	58.33	26.22	24.1	13.88	47.63
24.9	55.61	50.02	24.9	20.69	50.98	24.9	46.71	5.77	25.1	58.27	25.94	25.1	13.76	47.41
25.9	55.76	49.78	25.9	21.07	50.71	25.9	46.72	5.36	26.1	58.22	25.67	26.1	13.63	47.21
26.9	55.89	49.54	26.9	21.41	50.45	26.9	46.75	4.96	27.1	58.15	25.43	27.1	13.50	47.01
27.9	56.01	49.31	27.9	21.71	50.19	27.9	46.78	4.57	28.1	58.07	25.19	28.1	13.35	46.81
28.9	56.14	49.06	28.9	22.00	49.93	28.9	46.83	4.18	29.1	57.98	24.93	29.1	13.20	46.60
29.9	56.26	48.79	29.9	22.31	49.65	29.9	46.88	3.80	30.1	57.88	24.66	30.1	13.03	46.41
30.9	56.39	48.51	30.9	22.64	49.34	30.9	46.93	3.44	31.1	57.79	24.38	31.1	12.86	46.18
13.70	+13.67		50.48	+50.47		11.92	-11.87		12.31	+12.27		11.86	+11.82	
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m    ° ' "		Apr.	h m    ° ' "		Apr.	h m    ° ' "		Apr.	h m    ° ' "		Apr.	h m    ° ' "	
	5 45    -84 49			6 46    -80 43			7 2    +87 11			7 13    +82 34			7 15    -86 54	
	s        "			s        "			s        "			s        "			s        "	
0.2	64.60	62.01	0.3	55.48	57.38	0.3	23.63	12.94	0.3	51.27	46.88	0.3	70.47	26.67
1.2	64.32	61.91	1.3	55.33	57.38	1.3	23.22	12.98	1.3	51.12	46.94	1.3	69.99	26.70
2.2	64.06	61.78	2.3	55.18	57.36	2.3	22.78	13.02	2.3	50.96	47.00	2.3	69.53	26.73
3.2	63.80	61.67	3.3	55.03	57.34	3.3	22.34	13.05	3.3	50.79	47.05	3.3	69.08	26.77
4.2	63.55	61.56	4.2	54.88	57.32	4.3	21.89	13.08	4.3	50.62	47.10	4.3	68.64	26.81
5.2	63.30	61.46	5.2	54.74	57.32	5.3	21.42	13.08	5.3	50.45	47.11	5.3	68.21	26.84
6.2	63.05	61.36	6.2	54.60	57.32	6.3	20.94	13.05	6.3	50.27	47.10	6.3	67.79	26.89
7.2	62.80	61.31	7.2	54.45	57.33	7.3	20.47	13.01	7.3	50.09	47.07	7.3	67.37	26.94
8.2	62.53	61.24	8.2	54.30	57.37	8.2	20.01	12.94	8.3	49.91	47.03	8.3	66.93	27.02
9.2	62.27	61.17	9.2	54.16	57.40	9.2	19.58	12.85	9.3	49.75	46.98	9.3	66.49	27.10
10.2	62.00	61.09	10.2	54.01	57.42	10.2	19.19	12.76	10.3	49.60	46.90	10.3	66.03	27.18
11.2	61.71	60.99	11.2	53.86	57.43	11.2	18.81	12.68	11.2	49.47	46.83	11.2	65.53	27.24
12.2	61.43	60.86	12.2	53.70	57.42	12.2	18.46	12.61	12.2	49.33	46.77	12.2	65.03	27.29
13.2	61.14	60.72	13.2	53.55	57.38	13.2	18.12	12.55	13.2	49.21	46.73	13.2	64.52	27.32
14.2	60.87	60.53	14.2	53.39	57.30	14.2	17.77	12.50	14.2	49.09	46.71	14.2	64.01	27.33
15.2	60.60	60.35	15.2	53.23	57.21	15.2	17.41	12.47	15.2	48.95	46.70	15.2	63.51	27.29
16.2	60.36	60.16	16.2	53.08	57.11	16.2	17.01	12.43	16.2	48.80	46.69	16.2	63.04	27.25
17.2	60.13	59.98	17.2	52.93	57.01	17.2	16.59	12.38	17.2	48.64	46.66	17.2	62.60	27.21
18.2	59.90	59.81	18.2	52.79	56.94	18.2	16.14	12.31	18.2	48.47	46.62	18.2	62.17	27.18
19.2	59.68	59.66	19.2	52.65	56.88	19.2	15.68	12.23	19.2	48.31	46.54	19.2	61.75	27.17
20.2	59.44	59.52	20.2	52.51	56.84	20.2	15.23	12.10	20.2	48.13	46.42	20.2	61.35	27.17
21.2	59.21	59.39	21.2	52.36	56.81	21.2	14.81	11.93	21.2	47.97	46.29	21.2	60.93	27.17
22.2	58.97	59.27	22.2	52.23	56.77	22.2	14.42	11.75	22.2	47.82	46.16	22.2	60.48	27.18
23.2	58.72	59.14	23.2	52.08	56.72	23.2	14.06	11.60	23.2	47.68	46.01	23.2	60.02	27.19
24.2	58.45	59.00	24.2	51.93	56.66	24.2	13.72	11.46	24.2	47.56	45.86	24.2	59.55	27.18
25.1	58.20	58.81	25.2	51.78	56.57	25.2	13.39	11.32	25.2	47.44	45.75	25.2	59.08	27.16
26.1	57.96	58.62	26.2	51.63	56.46	26.2	13.07	11.19	26.2	47.32	45.64	26.2	58.59	27.11
27.1	57.71	58.39	27.2	51.49	56.33	27.2	12.74	11.08	27.2	47.20	45.54	27.2	58.11	27.04
28.1	57.48	58.16	28.2	51.34	56.18	28.2	12.41	10.97	28.2	47.07	45.44	28.2	57.65	26.95
29.1	57.26	57.92	29.2	51.20	56.03	29.2	12.05	10.86	29.2	46.94	45.35	29.2	57.20	26.86
30.1	57.06	57.69	30.2	51.07	55.89	30.2	11.67	10.74	30.2	46.80	45.26	30.2	56.77	26.77
31.1	56.86	57.46	31.2	50.93	55.74	31.2	11.29	10.61	31.2	46.66	45.14	31.2	56.36	26.66
11.10	-11.06		6.21	-6.13		20.37	+20.35		7.74	+7.68		18.54	-18.51	
5 <sup>h</sup> 46 <sup>m</sup>	14°.756		6 <sup>h</sup> 46 <sup>m</sup>	58°.546		7 <sup>h</sup> 2 <sup>m</sup>	4°.048		7 <sup>h</sup> 13 <sup>m</sup>	42°.294		7 <sup>h</sup> 16 <sup>m</sup>	20°.292	
-84° 49'	46''.89		-80° 43'	38''.16		+87° 10'	54''.74		+82° 34'	30''.13		-86° 54'	6''.70	



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 8 16	° ' " +88 53 "	Apr.	h m 9 8	° ' " -85 20 "	Apr.	h m 9 25	° ' " +81 41 "	Apr.	h m 9 36	° ' " -80 34 "	Apr.	h m 10 21	° ' " +82 58 "
0.3	53.12	13.62	0.4	60.46	19.72	0.4	33.38	47.63	0.4	25.59	29.37	0.4	18.94	55.08
1.3	52.19	13.76	1.4	60.21	19.94	1.4	33.29	47.84	1.4	25.47	29.63	1.4	18.86	55.34
2.3	51.21	13.89	2.4	59.96	20.15	2.4	33.19	48.06	2.4	25.36	29.87	2.4	18.77	55.60
3.3	50.17	14.02	3.3	59.71	20.35	3.4	33.07	48.29	3.4	25.25	30.10	3.4	18.67	55.89
4.3	49.07	14.17	4.3	59.46	20.55	4.4	32.94	48.52	4.4	25.14	30.32	4.4	18.56	56.17
5.3	47.93	14.27	5.3	59.23	20.75	5.4	32.82	48.72	5.4	25.04	30.56	5.4	18.43	56.44
6.3	46.76	14.36	6.3	59.00	20.95	6.4	32.68	48.89	6.4	24.94	30.80	6.4	18.30	56.68
7.3	45.58	14.43	7.3	58.78	21.17	7.4	32.53	49.05	7.4	24.84	31.03	7.4	18.15	56.91
8.3	44.40	14.49	8.3	58.56	21.40	8.3	32.39	49.20	8.4	24.74	31.28	8.4	18.01	57.13
9.3	43.27	14.50	9.3	58.34	21.65	9.3	32.26	49.32	9.4	24.65	31.55	9.4	17.87	57.32
10.3	42.21	14.51	10.3	58.09	21.90	10.3	32.13	49.43	10.3	24.55	31.83	10.4	17.72	57.50
11.3	41.22	14.53	11.3	57.84	22.14	11.3	32.01	49.53	11.3	24.44	32.11	11.4	17.60	57.67
12.3	40.28	14.54	12.3	57.56	22.39	12.3	31.91	49.62	12.3	24.31	32.37	12.4	17.50	57.82
13.3	39.38	14.57	13.3	57.28	22.59	13.3	31.80	49.74	13.3	24.19	32.61	13.4	17.39	57.99
14.3	38.48	14.60	14.3	56.98	22.78	14.3	31.71	49.87	14.3	24.06	32.84	14.4	17.29	58.16
15.3	37.55	14.65	15.3	56.69	22.93	15.3	31.61	50.01	15.3	23.93	33.03	15.4	17.19	58.35
16.3	36.56	14.71	16.3	56.39	23.08	16.3	31.48	50.13	16.3	23.80	33.21	16.4	17.07	58.56
17.3	35.47	14.76	17.3	56.12	23.23	17.3	31.35	50.29	17.3	23.67	33.37	17.4	16.94	58.79
18.3	34.31	14.80	18.3	55.85	23.36	18.3	31.21	50.43	18.3	23.55	33.53	18.4	16.80	59.00
19.3	33.10	14.82	19.3	55.61	23.49	19.3	31.06	50.56	19.3	23.44	33.69	19.4	16.63	59.20
20.3	31.89	14.80	20.3	55.38	23.66	20.3	30.91	50.66	20.3	23.33	33.87	20.4	16.46	59.35
21.3	30.70	14.76	21.3	55.14	23.83	21.3	30.75	50.74	21.3	23.23	34.05	21.3	16.29	59.50
22.3	29.56	14.69	22.3	54.90	24.01	22.3	30.60	50.79	22.3	23.12	34.28	22.3	16.13	59.63
23.3	28.50	14.62	23.3	54.64	24.19	23.3	30.47	50.82	23.3	23.00	34.50	23.3	15.98	59.73
24.3	27.50	14.55	24.3	54.37	24.38	24.3	30.33	50.85	24.3	22.88	34.71	24.3	15.83	59.82
25.3	26.55	14.48	25.3	54.08	24.54	25.3	30.22	50.89	25.3	22.76	34.91	25.3	15.69	59.92
26.3	25.61	14.43	26.3	53.79	24.68	26.3	30.10	50.93	26.3	22.63	35.09	26.3	15.56	60.04
27.2	24.68	14.40	27.3	53.49	24.79	27.3	29.98	50.99	27.3	22.49	35.24	27.3	15.43	60.17
28.2	23.71	14.37	28.3	53.19	24.89	28.3	29.87	51.07	28.3	22.36	35.37	28.3	15.30	60.29
29.2	22.72	14.35	29.3	52.90	24.96	29.3	29.74	51.15	29.3	22.22	35.48	29.3	15.17	60.42
30.2	21.68	14.33	30.3	52.60	25.04	30.3	29.61	51.22	30.3	22.08	35.58	30.3	15.02	60.56
31.2	20.60	14.29	31.3	52.32	25.10	31.3	29.47	51.29	31.3	21.95	35.67	31.3	14.86	60.69
51.50 +51.49			12.31 -12.27			6.92 +6.85			6.11 -6.03			8.19 +8.12		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

γ Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "	
Apr. 11 0	-84 9		Apr. 12 15	+88 9		Apr. 12 46	-84 40		Apr. 12 48	+83 51		Apr. 13 27	-85 21	
0.4	4.19	10.16	0.5	13.59	26.87	0.5	21.97	35.04	0.5	44.26	37.66	0.5	32.87	51.43
1.4	4.08	10.50	1.5	13.57	27.18	1.5	21.98	35.43	1.5	44.28	37.97	1.5	32.93	51.81
2.4	3.97	10.83	2.5	13.51	27.51	2.5	21.98	35.80	2.5	44.30	38.30	2.5	32.98	52.18
3.4	3.85	11.16	3.5	13.44	27.84	3.5	21.97	36.16	3.5	44.31	38.63	3.5	33.02	52.54
4.4	3.74	11.48	4.5	13.31	28.17	4.5	21.97	36.52	4.5	44.31	38.97	4.5	33.07	52.89
5.4	3.64	11.79	5.5	13.14	28.51	5.5	21.96	36.87	5.5	44.29	39.32	5.5	33.12	53.22
6.4	3.54	12.10	6.5	12.94	28.85	6.5	21.97	37.21	6.5	44.26	39.67	6.5	33.17	53.55
7.4	3.46	12.40	7.5	12.69	29.18	7.5	21.99	37.54	7.5	44.22	40.02	7.5	33.26	53.89
8.4	3.37	12.73	8.5	12.41	29.49	8.5	22.02	37.90	8.5	44.17	40.36	8.5	33.34	54.24
9.4	3.29	13.09	9.5	12.11	29.78	9.5	22.05	38.28	9.5	44.11	40.68	9.5	33.42	54.60
10.4	3.20	13.45	10.5	11.81	30.05	10.5	22.08	38.68	10.5	44.05	40.96	10.5	33.51	54.98
11.4	3.10	13.81	11.5	11.53	30.32	11.5	22.09	39.09	11.5	43.99	41.24	11.5	33.60	55.39
12.4	2.97	14.17	12.5	11.28	30.56	12.5	22.10	39.50	12.5	43.95	41.51	12.5	33.66	55.80
13.4	2.84	14.54	13.5	11.07	30.80	13.5	22.09	39.92	13.5	43.92	41.77	13.5	33.71	56.22
14.4	2.70	14.88	14.4	10.87	31.05	14.5	22.05	40.32	14.5	43.91	42.03	14.5	33.71	56.63
15.4	2.55	15.18	15.4	10.69	31.33	15.5	22.00	40.70	15.5	43.88	42.31	15.5	33.71	57.01
16.4	2.39	15.47	16.4	10.50	31.62	16.5	21.93	41.07	16.5	43.84	42.62	16.5	33.70	57.39
17.4	2.24	15.74	17.4	10.26	31.91	17.5	21.87	41.42	17.5	43.80	42.94	17.5	33.69	57.76
18.4	2.10	16.00	18.4	9.96	32.22	18.5	21.82	41.74	18.5	43.74	43.28	18.5	33.69	58.09
19.4	1.96	16.27	19.4	9.59	32.53	19.5	21.79	42.06	19.5	43.66	43.62	19.5	33.69	58.41
20.4	1.85	16.55	20.4	9.18	32.84	20.5	21.77	42.38	20.5	43.58	43.95	20.5	33.72	58.74
21.4	1.74	16.83	21.4	8.75	33.12	21.5	21.76	42.72	21.5	43.47	44.27	21.5	33.76	59.10
22.4	1.63	17.14	22.4	8.29	33.36	22.4	21.75	43.09	22.4	43.36	44.55	22.5	33.80	59.46
23.4	1.50	17.46	23.4	7.85	33.59	23.4	21.73	43.46	23.4	43.25	44.80	23.5	33.84	59.84
24.4	1.37	17.78	24.4	7.42	33.81	24.4	21.70	43.85	24.4	43.16	45.05	24.5	33.86	60.23
25.4	1.23	18.07	25.4	7.04	34.03	25.4	21.66	44.23	25.4	43.08	45.30	25.5	33.87	60.62
26.4	1.06	18.37	26.4	6.66	34.24	26.4	21.60	44.61	26.4	42.99	45.54	26.5	33.86	61.02
27.4	0.89	18.64	27.4	6.32	34.46	27.4	21.52	44.98	27.4	42.92	45.79	27.5	33.82	61.41
28.4	0.71	18.89	28.4	5.99	34.69	28.4	21.44	45.34	28.4	42.84	46.05	28.5	33.77	61.78
29.4	0.53	19.13	29.4	5.64	34.93	29.4	21.34	45.68	29.4	42.77	46.32	29.5	33.71	62.14
30.4	0.35	19.36	30.4	5.27	35.18	30.4	21.24	46.00	30.4	42.69	46.60	30.5	33.64	62.48
31.3	0.18	19.56	31.4	4.86	35.44	31.4	21.14	46.30	31.4	42.59	46.88	31.5	33.58	62.80
9.82	-9.77		31.12	+31.11		10.78	-10.73		9.35	+9.30		12.38	-12.34	
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 14 13	° ' -83 17	Apr.	h m 15 3	° ' +87 32	Apr.	h m 15 24	° ' -84 11	Apr.	h m 16 54	° ' +82 10	Apr.	h m 17 16	° ' -80 46
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	41.70	26.36	0.6	57.73	49.51	0.6	12.62	28.96	0.7	26.72	9.09	0.7	4.14	55.89
1.6	41.78	26.73	1.6	58.04	49.75	1.6	12.79	29.26	1.7	26.86	9.22	1.7	4.29	56.06
2.6	41.86	27.09	2.6	58.35	50.02	2.6	12.93	29.57	2.7	27.01	9.37	2.7	4.44	56.21
3.6	41.93	27.43	3.6	58.65	50.29	3.6	13.08	29.85	3.7	27.15	9.52	3.7	4.57	56.35
4.6	42.01	27.77	4.6	58.93	50.59	4.6	13.23	30.14	4.7	27.31	9.69	4.7	4.71	56.49
5.6	42.08	28.07	5.6	59.20	50.90	5.6	13.38	30.40	5.7	27.45	9.88	5.7	4.85	56.64
6.6	42.16	28.38	6.6	59.43	51.21	6.6	13.53	30.64	6.7	27.59	10.11	6.7	4.98	56.74
7.5	42.24	28.70	7.6	59.63	51.54	7.6	13.70	30.90	7.7	27.72	10.35	7.7	5.12	56.84
8.5	42.35	29.01	8.6	59.80	51.86	8.6	13.88	31.16	8.7	27.85	10.59	8.7	5.27	56.95
9.5	42.45	29.33	9.6	59.93	52.17	9.6	14.05	31.43	9.7	27.97	10.82	9.7	5.43	57.07
10.5	42.55	29.69	10.6	60.06	52.47	10.6	14.24	31.71	10.7	28.07	11.06	10.7	5.60	57.19
11.5	42.66	30.06	11.6	60.18	52.75	11.6	14.43	32.02	11.6	28.17	11.29	11.7	5.77	57.32
12.5	42.75	30.45	12.6	60.31	53.02	12.6	14.62	32.34	12.6	28.28	11.49	12.7	5.95	57.49
13.5	42.84	30.85	13.6	60.44	53.28	13.6	14.79	32.68	13.6	28.39	11.68	13.7	6.12	57.68
14.5	42.89	31.26	14.6	60.61	53.54	14.6	14.93	33.03	14.6	28.49	11.87	14.7	6.26	57.88
15.5	42.94	31.65	15.6	60.79	53.80	15.6	15.06	33.38	15.6	28.62	12.05	15.7	6.41	58.09
16.5	42.98	32.01	16.6	60.98	54.08	16.6	15.17	33.71	16.6	28.74	12.25	16.7	6.55	58.30
17.5	43.01	32.35	17.6	61.17	54.39	17.6	15.27	34.03	17.6	28.86	12.47	17.6	6.68	58.51
18.5	43.05	32.69	18.6	61.32	54.71	18.6	15.38	34.32	18.6	28.97	12.73	18.6	6.78	58.70
19.5	43.09	33.00	19.6	61.44	55.06	19.6	15.50	34.59	19.6	29.09	13.00	19.6	6.90	58.85
20.5	43.15	33.31	20.5	61.52	55.41	20.6	15.63	34.87	20.6	29.19	13.30	20.6	7.03	59.00
21.5	43.22	33.64	21.5	61.56	55.76	21.6	15.77	35.15	21.6	29.28	13.61	21.6	7.17	59.14
22.5	43.30	33.97	22.5	61.56	56.10	22.6	15.92	35.43	22.6	29.37	13.92	22.6	7.32	59.30
23.5	43.36	34.34	23.5	61.57	56.41	23.6	16.08	35.75	23.6	29.45	14.21	23.6	7.47	59.46
24.5	43.42	34.71	24.5	61.58	56.73	24.6	16.22	36.08	24.6	29.53	14.50	24.6	7.62	59.65
25.5	43.48	35.10	25.5	61.58	57.01	25.5	16.36	36.42	25.6	29.61	14.76	25.6	7.78	59.87
26.5	43.53	35.48	26.5	61.61	57.30	26.5	16.48	36.79	26.6	29.69	15.02	26.6	7.92	60.09
27.5	43.54	35.86	27.5	61.66	57.57	27.5	16.58	37.14	27.6	29.77	15.26	27.6	8.06	60.33
28.5	43.56	36.24	28.5	61.71	57.86	28.5	16.68	37.49	28.6	29.85	15.50	28.6	8.18	60.58
29.5	43.57	36.61	29.5	61.77	58.17	29.5	16.76	37.84	29.6	29.94	15.76	29.6	8.29	60.81
30.5	43.56	36.95	30.5	61.83	58.48	30.5	16.82	38.18	30.6	30.03	16.02	30.6	8.40	61.05
31.5	43.55	37.28	31.5	61.86	58.80	31.5	16.88	38.51	31.6	30.11	16.30	31.6	8.50	61.29
8.56	-8.50		23.37	+23.35		9.88	-9.83		7.34	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21".03			+87° 33' 10".52			-84° 11' 30".39			+82° 10' 32".75			-80° 47' 6".56		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m 17 58 s	° ' " +86 36 "	Apr.	h m 18 6 s	° ' " -87 39 "	Apr.	h m 19 1 s	° ' " +89 0 "	Apr.	h m 19 28 s	° ' " -89 13 "	Apr.	h m 20 48 s	° ' " +82 13 "
0.7	54.71	29.25	0.7	38.16	36.38	0.8	50.93	43.34	0.8	26.08	8.64	0.8	32.48	18.05
1.7	55.05	29.29	1.7	38.79	36.47	1.8	52.13	43.29	1.8	27.96	8.58	1.8	32.61	17.88
2.7	55.42	29.34	2.7	39.39	36.54	2.8	53.38	43.27	2.8	29.78	8.52	2.8	32.74	17.71
3.7	55.80	29.42	3.7	39.96	36.60	3.8	54.67	43.26	3.8	31.54	8.46	3.8	32.89	17.56
4.7	56.17	29.51	4.7	40.53	36.66	4.8	56.01	43.26	4.8	33.24	8.40	4.8	33.04	17.41
5.7	56.55	29.60	5.7	41.09	36.72	5.8	57.36	43.27	5.8	34.91	8.32	5.8	33.20	17.26
6.7	56.91	29.74	6.7	41.66	36.77	6.8	58.73	43.31	6.8	36.56	8.24	6.8	33.37	17.15
7.7	57.28	29.89	7.7	42.23	36.79	7.7	60.06	43.37	7.8	38.23	8.15	7.8	33.54	17.06
8.7	57.61	30.06	8.7	42.83	36.81	8.7	61.35	43.45	8.8	39.97	8.05	8.8	33.69	16.99
9.7	57.94	30.23	9.7	43.47	36.85	9.7	62.56	43.54	9.8	41.79	7.95	9.8	33.86	16.93
10.7	58.24	30.40	10.7	44.12	36.90	10.7	63.70	43.63	10.8	43.71	7.85	10.8	34.02	16.89
11.7	58.52	30.55	11.7	44.81	36.98	11.7	64.77	43.71	11.8	45.72	7.77	11.8	34.17	16.85
12.7	58.80	30.71	12.7	45.50	37.06	12.7	65.80	43.79	12.8	47.80	7.72	12.8	34.32	16.81
13.7	59.08	30.83	13.7	46.18	37.19	13.7	66.82	43.85	13.8	49.90	7.71	13.8	34.45	16.76
14.7	59.37	30.94	14.7	46.83	37.33	14.7	67.86	43.89	14.7	51.94	7.69	14.8	34.59	16.67
15.7	59.68	31.05	15.7	47.44	37.48	15.7	68.97	43.92	15.7	53.90	7.69	15.8	34.73	16.58
16.7	60.00	31.18	16.7	48.01	37.63	16.7	70.16	43.97	16.7	55.75	7.72	16.8	34.88	16.48
17.7	60.33	31.33	17.7	48.54	37.76	17.7	71.41	44.03	17.7	57.48	7.74	17.8	35.05	16.40
18.7	60.67	31.51	18.7	49.06	37.89	18.7	72.71	44.11	18.7	59.13	7.74	18.8	35.22	16.34
19.7	61.00	31.71	19.7	49.58	37.99	19.7	74.01	44.22	19.7	60.76	7.72	19.8	35.39	16.31
20.7	61.32	31.94	20.7	50.12	38.07	20.7	75.27	44.36	20.7	62.43	7.68	20.8	35.57	16.31
21.7	61.61	32.19	21.7	50.69	38.15	21.7	76.46	44.53	21.7	64.16	7.63	21.8	35.74	16.32
22.7	61.88	32.43	22.7	51.28	38.24	22.7	77.59	44.71	22.7	65.97	7.59	22.8	35.92	16.36
23.7	62.12	32.66	23.7	51.90	38.35	23.7	78.63	44.89	23.7	67.87	7.57	23.8	36.07	16.39
24.7	62.37	32.89	24.7	52.53	38.47	24.7	79.61	45.03	24.7	69.83	7.56	24.8	36.23	16.43
25.7	62.60	33.11	25.7	53.15	38.61	25.7	80.58	45.17	25.7	71.81	7.57	25.8	36.39	16.46
26.7	62.83	33.31	26.7	53.77	38.78	26.7	81.55	45.31	26.7	73.79	7.61	26.8	36.54	16.47
27.7	63.08	33.49	27.7	54.34	38.96	27.7	82.52	45.42	27.7	75.72	7.67	27.8	36.69	16.48
28.6	63.33	33.69	28.7	54.90	39.15	28.7	83.54	45.53	28.7	77.58	7.73	28.8	36.83	16.48
29.6	63.60	33.88	29.7	55.41	39.34	29.7	84.61	45.66	29.7	79.37	7.80	29.8	36.99	16.47
30.6	63.88	34.10	30.6	55.90	39.54	30.7	85.71	45.79	30.7	81.07	7.87	30.8	37.15	16.47
31.6	64.15	34.32	31.6	56.37	39.73	31.7	86.83	45.93	31.7	82.71	7.94	31.8	37.31	16.50
16.90	+16.87		24.50	-24.48		58.01	+58.00		73.35	-73.34		7.39	+7.32	
17 <sup>h</sup> 59 <sup>m</sup>	1°.307		18 <sup>h</sup> 6 <sup>m</sup>	11°.893		19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup>	40°.494	
+86° 36'	51''.17		-87° 39'	51''.82		+89° 1'	2''.17		-89° 13'	28''.57		+82° 13'	29''.86	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Apr.	h m	° ' "	Apr.	h m	° ' "	Apr.	h m	° ' "	Apr.	h m	° ' "	Apr.	h m	° ' "
	21 38	-83 5		22 16	-86 22		22 37	-81 48		23 27	+86 50		23 47	-82 28
	s	"		s	"		s	"		s	"		s	"
0.9	19.32	46.51	0.9	2.96	66.95	0.9	36.56	43.65	0.9	18.87	62.81	0.9	10.79	33.14
1.9	19.48	46.26	1.9	3.23	66.66	1.9	36.66	43.33	1.9	18.97	62.52	1.9	10.85	32.77
2.9	19.64	46.01	2.9	3.49	66.36	2.9	36.76	43.00	2.9	19.10	62.21	2.9	10.91	32.41
3.9	19.79	45.77	3.9	3.73	66.07	3.9	36.87	42.70	3.9	19.24	61.90	3.9	10.97	32.05
4.9	19.94	45.53	4.9	3.96	65.79	4.9	36.96	42.40	4.9	19.41	61.59	4.9	11.02	31.72
5.9	20.08	45.27	5.9	4.18	65.53	5.9	37.05	42.10	5.9	19.60	61.27	5.9	11.06	31.39
6.9	20.22	45.02	6.9	4.39	65.26	6.9	37.13	41.80	6.9	19.82	60.98	6.9	11.09	31.05
7.9	20.35	44.76	7.9	4.59	64.95	7.9	37.21	41.48	7.9	20.05	60.69	7.9	11.12	30.69
8.9	20.49	44.49	8.9	4.81	64.64	8.9	37.28	41.15	8.9	20.30	60.43	8.9	11.17	30.33
9.9	20.65	44.20	9.9	5.03	64.32	9.9	37.38	40.81	9.9	20.57	60.19	9.9	11.21	29.93
10.9	20.82	43.91	10.9	5.30	63.98	10.9	37.47	40.45	10.9	20.82	59.96	10.9	11.27	29.53
11.8	20.99	43.62	11.9	5.57	63.65	11.9	37.60	40.09	11.9	21.06	59.74	11.9	11.33	29.14
12.8	21.18	43.34	12.9	5.88	63.33	12.9	37.73	39.73	12.9	21.28	59.54	12.9	11.42	28.73
13.8	21.39	43.09	13.9	6.21	63.03	13.9	37.87	39.40	13.9	21.47	59.32	13.9	11.51	28.34
14.8	21.59	42.85	14.9	6.54	62.75	14.9	38.02	39.09	14.9	21.66	59.10	14.9	11.61	27.96
15.8	21.79	42.65	15.9	6.88	62.50	15.9	38.15	38.81	15.9	21.83	58.85	15.9	11.71	27.59
16.8	21.98	42.46	16.9	7.20	62.26	16.9	38.28	38.55	16.9	22.04	58.58	16.9	11.81	27.27
17.8	22.16	42.28	17.9	7.49	62.03	17.9	38.39	38.29	17.9	22.27	58.32	17.9	11.90	26.95
18.8	22.30	42.08	18.9	7.75	61.79	18.9	38.50	38.02	18.9	22.54	58.07	18.9	11.97	26.63
19.8	22.47	41.88	19.9	8.00	61.56	19.9	38.60	37.75	19.9	22.84	57.82	19.9	12.03	26.32
20.8	22.63	41.67	20.8	8.24	61.29	20.9	38.71	37.48	20.9	23.16	57.58	20.9	12.09	25.99
21.8	22.79	41.44	21.8	8.50	61.02	21.9	38.81	37.18	21.9	23.50	57.38	21.9	12.15	25.65
22.8	22.95	41.20	22.8	8.78	60.75	22.9	38.93	36.87	22.9	23.83	57.19	22.9	12.23	25.28
23.8	23.13	40.96	23.8	9.07	60.47	23.9	39.06	36.55	23.9	24.16	57.02	23.9	12.31	24.91
24.8	23.33	40.72	24.8	9.39	60.18	24.9	39.19	36.24	24.9	24.47	56.85	24.9	12.41	24.53
25.8	23.53	40.52	25.8	9.73	59.93	25.8	39.33	35.95	25.9	24.75	56.68	25.9	12.52	24.17
26.8	23.74	40.32	26.8	10.09	59.70	26.8	39.48	35.67	26.9	25.03	56.52	26.9	12.65	23.83
27.8	23.95	40.14	27.8	10.44	59.46	27.8	39.64	35.42	27.9	25.29	56.34	27.9	12.77	23.50
28.8	24.15	39.98	28.8	10.79	59.25	28.8	39.79	35.18	28.9	25.56	56.16	28.9	12.89	23.16
29.8	24.36	39.83	29.8	11.14	59.06	29.8	39.94	34.95	29.9	25.83	55.96	29.9	13.01	22.87
30.8	24.55	39.70	30.8	11.48	58.87	30.8	40.09	34.74	30.9	26.12	55.75	30.9	13.12	22.57
31.8	24.74	39.60	31.8	11.79	58.69	31.8	40.22	34.54	31.9	26.42	55.55	31.9	13.23	22.28
8.32	-8.26		15.86	-15.82		7.02	-6.95		18.20	+18.17		7.64	-7.57	
21 <sup>h</sup> 38 <sup>m</sup>	19° 54'		22 <sup>h</sup> 16 <sup>m</sup>	8° 65'		22 <sup>h</sup> 37 <sup>m</sup>	39° 01'		23 <sup>h</sup> 27 <sup>m</sup>	44° 12'		23 <sup>h</sup> 47 <sup>m</sup>	16° 42'	
-83° 6'	6'' 99		-86° 23'	27'' 13		-81° 49'	2'' 34		+86° 50'	58'' 89		-82° 28'	48'' 42	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m	° ' "	May	h m	° ' "	May	h m	° ' "	May	h m	° ' "	May	h m	° ' "
	0 56	+85 48		1 29	+88 51		1 41	-85 10		4 9	+85 20		5 35	+85 9
	s	" "		s	" "		s	" "		s	" "		s	" "
0.9	56.39	48.51	0.9	22.64	49.34	0.9	46.93	63.44	1.1	57.79	24.38	1.1	12.86	46.18
1.9	56.53	48.22	1.9	23.03	49.02	1.9	46.98	63.10	2.1	57.70	24.09	2.1	12.70	45.94
2.9	56.70	47.94	2.9	23.47	48.70	2.9	47.03	62.76	3.1	57.62	23.77	3.1	12.53	45.68
3.9	56.87	47.65	3.9	23.97	48.39	3.9	47.07	62.44	4.1	57.56	23.43	4.1	12.38	45.40
4.9	57.06	47.38	4.9	24.56	48.10	4.9	47.09	62.12	5.1	57.51	23.09	5.1	12.24	45.12
5.9	57.29	47.13	5.9	25.22	47.80	5.9	47.12	61.79	6.1	57.50	22.75	6.1	12.12	44.80
6.9	57.52	46.89	6.9	25.93	47.52	6.9	47.13	61.43	7.0	57.49	22.42	7.1	12.02	44.51
7.9	57.76	46.68	7.9	26.65	47.28	7.9	47.15	61.07	8.0	57.49	22.10	8.1	11.94	44.21
8.9	58.00	46.49	8.9	27.37	47.04	8.9	47.19	60.66	9.0	57.52	21.80	9.1	11.88	43.93
9.9	58.21	46.31	9.9	28.05	46.83	9.9	47.24	60.27	10.0	57.55	21.52	10.1	11.82	43.69
10.9	58.41	46.14	10.9	28.67	46.64	10.9	47.33	59.88	11.0	57.56	21.26	11.1	11.75	43.45
11.9	58.60	45.96	11.9	29.22	46.42	11.9	47.42	59.48	12.0	57.57	21.00	12.1	11.67	43.21
12.9	58.78	45.77	12.9	29.74	46.20	12.9	47.52	59.10	13.0	57.56	20.74	13.1	11.59	42.98
13.9	58.96	45.58	13.9	30.26	45.97	13.9	47.65	58.75	14.0	57.53	20.46	14.1	11.49	42.75
14.9	59.14	45.35	14.9	30.82	45.70	14.9	47.76	58.43	15.0	57.50	20.15	15.1	11.38	42.48
15.9	59.36	45.12	15.9	31.44	45.44	15.9	47.85	58.12	16.0	57.49	19.83	16.1	11.26	42.20
16.9	59.58	44.89	16.9	32.17	45.17	16.9	47.94	57.83	17.0	57.48	19.50	17.1	11.16	41.88
17.9	59.85	44.68	17.9	32.99	44.90	17.9	48.01	57.52	18.0	57.51	19.15	18.1	11.08	41.54
18.9	60.12	44.49	18.9	33.87	44.65	18.9	48.07	57.21	19.0	57.55	18.82	19.1	11.02	41.20
19.9	60.41	44.31	19.9	34.81	44.43	19.9	48.14	56.88	20.0	57.60	18.49	20.1	10.99	40.85
20.9	60.70	44.16	20.9	35.74	44.25	20.9	48.22	56.55	21.0	57.69	18.16	21.1	10.96	40.53
21.9	60.97	44.01	21.9	36.65	44.07	21.9	48.31	56.20	22.0	57.78	17.88	22.1	10.95	40.24
22.9	61.24	43.89	22.9	37.50	43.89	22.9	48.42	55.85	23.0	57.86	17.59	23.1	10.94	39.95
23.9	61.48	43.77	23.9	38.30	43.73	23.9	48.55	55.50	24.0	57.92	17.32	24.1	10.93	39.67
24.9	61.72	43.64	24.9	39.06	43.56	24.9	48.69	55.15	24.9	57.98	17.06	25.1	10.90	39.40
25.9	61.95	43.50	25.9	39.81	43.39	25.9	48.84	54.82	25.9	58.04	16.78	26.1	10.87	39.14
26.9	62.18	43.37	26.9	40.54	43.22	26.9	49.00	54.50	26.9	58.09	16.51	27.1	10.83	38.87
27.9	62.41	43.22	27.9	41.28	43.03	27.9	49.15	54.21	27.9	58.13	16.23	28.1	10.78	38.60
28.9	62.65	43.07	28.9	42.06	42.83	28.9	49.30	53.92	28.9	58.18	15.95	29.0	10.74	38.32
29.9	62.91	42.91	29.9	42.89	42.64	29.9	49.46	53.64	29.9	58.22	15.64	30.0	10.69	38.02
30.8	63.18	42.75	30.9	43.79	42.44	30.9	49.60	53.37	30.9	58.28	15.33	31.0	10.65	37.69
31.8	63.46	42.60	31.9	44.75	42.23	31.9	49.73	53.13	31.9	58.36	15.00	32.0	10.63	37.35
13.69	+13.66		50.38	+50.37		11.91	-11.87		12.31	+12.27		11.86	+11.81	
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 5 45	° -84 49	May	h m 6 46	° -80 43	May	h m 7 2	° +87 11	May	h m 7 13	° +82 34	May	h m 7 15	° -86 54
	s	"		s	"		s	"		s	"		s	"
1.1	56.86	57.46	1.2	50.93	55.74	1.2	11.29	10.61	1.2	46.66	45.14	1.2	56.36	26.66
2.1	56.67	57.24	2.2	50.81	55.58	2.2	10.89	10.46	2.2	46.51	45.01	2.2	55.97	26.56
3.1	56.48	57.04	3.2	50.68	55.44	3.2	10.48	10.28	3.2	46.35	44.86	3.2	55.58	26.48
4.1	56.29	56.84	4.2	50.56	55.32	4.2	10.09	10.08	4.2	46.20	44.70	4.2	55.19	26.40
5.1	56.10	56.65	5.2	50.44	55.22	5.2	9.71	9.86	5.2	46.05	44.51	5.2	54.81	26.34
6.1	55.90	56.48	6.2	50.32	55.11	6.2	9.37	9.63	6.2	45.91	44.31	6.2	54.41	26.28
7.1	55.70	56.31	7.2	50.20	55.00	7.2	9.04	9.41	7.2	45.80	44.10	7.2	54.00	26.22
8.1	55.47	56.10	8.2	50.06	54.88	8.2	8.76	9.19	8.2	45.69	43.89	8.2	53.57	26.15
9.1	55.25	55.87	9.2	49.93	54.75	9.2	8.51	8.98	9.2	45.59	43.69	9.2	53.12	26.07
10.1	55.03	55.63	10.1	49.79	54.59	10.2	8.28	8.77	10.2	45.50	43.50	10.2	52.66	25.95
11.1	54.83	55.35	11.1	49.66	54.39	11.2	8.04	8.57	11.2	45.42	43.33	11.2	52.20	25.82
12.1	54.63	55.06	12.1	49.53	54.16	12.2	7.79	8.40	12.2	45.33	43.18	12.2	51.76	25.66
13.1	54.45	54.77	13.1	49.41	53.93	13.2	7.52	8.23	13.2	45.23	43.03	13.2	51.34	25.48
14.1	54.28	54.48	14.1	49.29	53.71	14.1	7.22	8.04	14.2	45.12	42.86	14.2	50.96	25.30
15.1	54.13	54.20	15.1	49.18	53.50	15.1	6.90	7.84	15.2	45.00	42.69	15.2	50.59	25.14
16.1	53.98	53.95	16.1	49.08	53.30	16.1	6.58	7.62	16.2	44.87	42.49	16.2	50.25	25.00
17.1	53.83	53.73	17.1	48.97	53.12	17.1	6.24	7.38	17.1	44.73	42.26	17.2	49.92	24.87
18.1	53.69	53.49	18.1	48.87	52.97	18.1	5.94	7.11	18.1	44.62	42.01	18.1	49.58	24.75
19.1	53.52	53.27	19.1	48.77	52.81	19.1	5.67	6.82	19.1	44.51	41.74	19.1	49.22	24.63
20.1	53.35	53.05	20.1	48.66	52.64	20.1	5.43	6.52	20.1	44.41	41.47	20.1	48.85	24.51
21.1	53.18	52.81	21.1	48.55	52.46	21.1	5.22	6.23	21.1	44.34	41.21	21.1	48.47	24.38
22.1	53.00	52.55	22.1	48.44	52.26	22.1	5.03	5.96	22.1	44.27	40.96	22.1	48.07	24.25
23.1	52.84	52.26	23.1	48.33	52.04	23.1	4.85	5.70	23.1	44.20	40.72	23.1	47.68	24.07
24.1	52.69	51.95	24.1	48.22	51.80	24.1	4.69	5.45	24.1	44.14	40.50	24.1	47.29	23.87
25.1	52.54	51.63	25.1	48.11	51.55	25.1	4.50	5.21	25.1	44.07	40.29	25.1	46.91	23.67
26.1	52.40	51.32	26.1	48.01	51.28	26.1	4.30	4.97	26.1	43.99	40.07	26.1	46.56	23.45
27.1	52.28	50.99	27.1	47.91	51.01	27.1	4.09	4.75	27.1	43.91	39.86	27.1	46.22	23.22
28.1	52.17	50.68	28.1	47.82	50.73	28.1	3.87	4.51	28.1	43.82	39.63	28.1	45.89	22.99
29.1	52.07	50.36	29.1	47.73	50.46	29.1	3.64	4.27	29.1	43.73	39.41	29.1	45.60	22.76
30.1	51.98	50.06	30.1	47.65	50.21	30.1	3.41	4.01	30.1	43.64	39.16	30.1	45.32	22.56
31.0	51.88	49.78	31.1	47.57	49.99	31.1	3.17	3.73	31.1	43.55	38.89	31.1	45.04	22.36
32.0	51.78	49.52	32.1	47.50	49.76	32.1	2.96	3.42	32.1	43.46	38.61	32.1	44.76	22.18
11.10	-11.06		6.21	-6.13		20.37	+20.34		7.74	+7.68		18.53	-18.51	
5 <sup>h</sup> 46 <sup>m</sup>	14°.756		6 <sup>h</sup> 46 <sup>m</sup>	58°.546		7 <sup>h</sup> 2 <sup>m</sup>	4°.048		7 <sup>h</sup> 13 <sup>m</sup>	42°.294		7 <sup>h</sup> 16 <sup>m</sup>	20°.292	
-84° 49'	46''.89		-80° 43'	38''.16		+87° 10'	54''.74		+82° 34'	30''.13		-86° 54'	6''.70	



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			♄ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 8 15	° ' " +88 53	May	h m 9 8	° ' " -85 20	May	h m 9 25	° ' " +81 41	May	h m 9 36	° ' " -80 34	May	h m 10 21	° ' " +82 59
	s "			s "			s "			s "			s "	
1.2	80.60	14.29	1.3	52.32	25.10	1.3	29.47	51.29	1.3	21.95	35.67	1.3	14.86	0.69
2.2	79.48	14.24	2.3	52.05	25.16	2.3	29.32	51.35	2.3	21.82	35.77	2.3	14.69	0.84
3.2	78.34	14.16	3.3	51.80	25.23	3.3	29.16	51.39	3.3	21.70	35.86	3.3	14.52	0.96
4.2	77.18	14.08	4.3	51.54	25.31	4.3	29.01	51.40	4.3	21.59	35.97	4.3	14.34	1.07
5.2	76.04	13.97	5.3	51.30	25.40	5.3	28.85	51.41	5.3	21.47	36.09	5.3	14.16	1.15
6.2	74.93	13.84	6.3	51.05	25.49	6.3	28.69	51.38	6.3	21.35	36.21	6.3	13.97	1.20
7.2	73.89	13.69	7.3	50.79	25.60	7.3	28.55	51.34	7.3	21.23	36.36	7.3	13.80	1.26
8.2	72.94	13.54	8.3	50.52	25.72	8.3	28.41	51.29	8.3	21.11	36.50	8.3	13.64	1.26
9.2	72.05	13.39	9.3	50.23	25.82	9.3	28.29	51.23	9.3	20.99	36.64	9.3	13.49	1.28
10.2	71.25	13.25	10.2	49.92	25.89	10.3	28.19	51.18	10.3	20.86	36.76	10.3	13.35	1.30
11.2	70.45	13.12	11.2	49.61	25.94	11.3	28.08	51.14	11.3	20.72	36.85	11.3	13.22	1.33
12.2	69.64	13.01	12.2	49.30	25.96	12.3	27.98	51.10	12.3	20.57	36.91	12.3	13.09	1.37
13.2	68.78	12.91	13.2	49.00	25.96	13.3	27.85	51.10	13.3	20.42	36.96	13.3	12.96	1.41
14.2	67.86	12.81	14.2	48.71	25.96	14.3	27.73	51.09	14.3	20.28	36.99	14.3	12.81	1.47
15.2	66.86	12.69	15.2	48.43	25.95	15.2	27.59	51.08	15.3	20.15	37.01	15.3	12.63	1.55
16.2	65.81	12.56	16.2	48.17	25.95	16.2	27.43	51.06	16.3	20.02	37.03	16.3	12.46	1.60
17.2	64.74	12.39	17.2	47.93	25.95	17.2	27.28	51.01	17.2	19.90	37.06	17.3	12.27	1.65
18.2	63.70	12.20	18.2	47.69	25.98	18.2	27.13	50.93	18.2	19.78	37.10	18.3	12.08	1.64
19.2	62.72	11.98	19.2	47.45	26.01	19.2	26.98	50.84	19.2	19.67	37.18	19.3	11.89	1.62
20.2	61.81	11.76	20.2	47.19	26.05	20.2	26.84	50.73	20.2	19.55	37.26	20.3	11.71	1.59
21.2	60.98	11.54	21.2	46.92	26.09	21.2	26.71	50.60	21.2	19.44	37.33	21.3	11.56	1.54
22.2	60.22	11.31	22.2	46.64	26.12	22.2	26.61	50.48	22.2	19.31	37.39	22.3	11.41	1.49
23.2	59.48	11.12	23.2	46.36	26.13	23.2	26.50	50.37	23.2	19.18	37.43	23.3	11.26	1.44
24.2	58.79	10.92	24.2	46.07	26.10	24.2	26.39	50.27	24.2	19.04	37.43	24.3	11.12	1.40
25.2	58.06	10.74	25.2	45.78	26.07	25.2	26.29	50.18	25.2	18.91	37.42	25.3	10.99	1.37
26.2	57.32	10.57	26.2	45.48	26.02	26.2	26.17	50.10	26.2	18.76	37.39	26.3	10.85	1.35
27.2	56.55	10.40	27.2	45.21	25.95	27.2	26.05	50.02	27.2	18.62	37.36	27.3	10.70	1.33
28.2	55.73	10.22	28.2	44.93	25.87	28.2	25.92	49.95	28.2	18.49	37.33	28.2	10.54	1.32
29.2	54.89	10.04	29.2	44.68	25.79	29.2	25.79	49.86	29.2	18.36	37.28	29.2	10.37	1.30
30.2	54.02	9.85	30.2	44.44	25.71	30.2	25.66	49.76	30.2	18.24	37.22	30.2	10.19	1.27
31.2	53.14	9.64	31.2	44.20	25.64	31.2	25.52	49.64	31.2	18.13	37.17	31.2	10.02	1.23
32.2	52.28	9.38	32.2	43.97	25.58	32.2	25.39	49.50	32.2	18.02	37.13	32.2	9.84	1.17
51.48	+51.47		12.31	-12.27		6.93	+6.85		6.11	-6.03		8.19	+8.13	
8 <sup>h</sup> 15 <sup>m</sup>	48°.380		9 <sup>h</sup> 8 <sup>m</sup>	57°.938		9 <sup>h</sup> 25 <sup>m</sup>	21°.719		9 <sup>h</sup> 36 <sup>m</sup>	22°.347		10 <sup>h</sup> 21 <sup>m</sup>	4°.831	
+88° 53'	0''.29		-85° 19'	57''.45		+81° 41'	41''.50		-80° 34'	6''.83		+82° 58'	54''.07	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

77 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			1 Octantis. Mag. 5.4			32 H. Camelop. seg. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m    " "		May	h m    " "		May	h m    " "		May	h m    " "		May	h m    " "	
	10 59    -84 9			12 14    +88 9			12 46    -84 40			12 48    +83 51			13 27    -85 22	
	s        "        "			s        "        "			s        "        "			s        "        "			s        "        "	
1.3	60.18    19.56		1.4	64.86    35.44		1.4	21.14    46.30		1.4	42.59    46.88		1.5	33.58    2.80	
2.3	60.02    19.76		2.4	64.42    35.68		2.4	21.06    46.59		2.4	42.48    47.18		2.4	33.53    3.12	
3.3	59.87    19.96		3.4	63.95    35.95		3.4	20.97    46.88		3.4	42.37    47.47		3.4	33.48    3.43	
4.3	59.71    20.18		4.4	63.43    36.19		4.4	20.90    47.17		4.4	42.24    47.77		4.4	33.43    3.73	
5.3	59.57    20.40		5.4	62.87    36.42		5.4	20.83    47.49		5.4	42.10    48.04		5.4	33.39    4.05	
6.3	59.43    20.65		6.4	62.29    36.61		6.4	20.77    47.81		6.4	41.95    48.28		6.4	33.38    4.37	
7.3	59.28    20.88		7.4	61.71    36.80		7.4	20.71    48.13		7.4	41.81    48.51		7.4	33.36    4.71	
8.3	59.13    21.13		8.4	61.15    36.98		8.4	20.65    48.47		8.4	41.67    48.72		8.4	33.33    5.08	
9.3	58.96    21.38		9.4	60.61    37.13		9.4	20.57    48.82		9.4	41.53    48.91		9.4	33.30    5.45	
10.3	58.78    21.64		10.4	60.13    37.26		10.4	20.47    49.18		10.4	41.41    49.09		10.4	33.24    5.83	
11.3	58.59    21.87		11.4	59.67    37.40		11.4	20.35    49.53		11.4	41.30    49.27		11.4	33.16    6.20	
12.3	58.38    22.07		12.4	59.24    37.57		12.4	20.21    49.86		12.4	41.19    49.46		12.4	33.06    6.55	
13.3	58.18    22.26		13.4	58.79    37.76		13.4	20.07    50.15		13.4	41.08    49.68		13.4	32.93    6.87	
14.3	57.97    22.41		14.4	58.33    37.95		14.4	19.93    50.43		14.4	40.96    49.91		14.4	32.81    7.17	
15.3	57.78    22.55		15.4	57.82    38.14		15.4	19.79    50.70		15.4	40.83    50.15		15.4	32.70    7.46	
16.3	57.59    22.69		16.4	57.23    38.33		16.4	19.66    50.94		16.4	40.68    50.39		16.4	32.59    7.74	
17.3	57.43    22.83		17.4	56.62    38.53		17.4	19.56    51.19		17.4	40.50    50.63		17.4	32.50    8.00	
18.3	57.28    22.98		18.4	55.96    38.71		18.4	19.46    51.45		18.4	40.33    50.84		18.4	32.43    8.28	
19.3	57.12    23.15		19.4	55.28    38.85		19.4	19.36    51.72		19.4	40.15    51.03		19.4	32.37    8.58	
20.3	56.95    23.34		20.3	54.61    38.96		20.4	19.27    52.00		20.4	39.98    51.20		20.4	32.31    8.91	
21.3	56.78    23.53		21.3	53.96    39.07		21.4	19.17    52.29		21.4	39.80    51.35		21.4	32.23    9.24	
22.3	56.60    23.71		22.3	53.35    39.17		22.4	19.05    52.59		22.4	39.64    51.49		22.4	32.14    9.58	
23.3	56.40    23.88		23.3	52.78    39.25		23.4	18.92    52.88		23.4	39.49    51.63		23.4	32.03    9.90	
24.3	56.20    24.03		24.3	52.23    39.33		24.4	18.77    53.17		24.4	39.34    51.77		24.4	31.90    10.23	
25.3	55.98    24.17		25.3	51.70    39.43		25.4	18.60    53.44		25.4	39.20    51.91		25.4	31.76    10.54	
26.3	55.76    24.29		26.3	51.16    39.53		26.4	18.43    53.68		26.4	39.06    52.07		26.4	31.61    10.83	
27.3	55.56    24.38		27.3	50.61    39.64		27.4	18.25    53.91		27.4	38.91    52.23		27.4	31.45    11.09	
28.3	55.36    24.47		28.3	50.05    39.75		28.3	18.07    54.13		28.4	38.75    52.39		28.4	31.27    11.35	
29.3	55.16    24.53		29.3	49.45    39.87		29.3	17.90    54.33		29.3	38.58    52.56		29.4	31.11    11.60	
30.3	54.95    24.59		30.3	48.81    39.98		30.3	17.75    54.53		30.3	38.41    52.74		30.4	30.96    11.83	
31.3	54.77    24.65		31.3	48.13    40.10		31.3	17.60    54.72		31.3	38.23    52.92		31.4	30.81    12.05	
32.3	54.59    24.73		32.3	47.44    40.21		32.3	17.45    54.91		32.3	38.04    53.08		32.4	30.68    12.27	
9.82    -9.77			31.15    +31.14			10.79    -10.74			9.36    +9.30			12.38    -12.34		
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84°    8'    50".60			+88°    9'    36".08			-84°    40'    22".34			+83°    51'    50".47			-85°    21'    42".23		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m 14 13	° ' -83 17	May	h m 15 3	° ' +87 32	May	h m 15 24	° ' -84 11	May	h m 16 54	° ' +82 10	May	h m 17 16	° ' -80 47
	s "			s "			s "			s "			s "	
1.5	43.55	37.28	1.5	61.86	58.80	1.5	16.88	38.51	1.6	30.11	16.30	1.6	8.50	1.29
2.5	43.55	37.60	2.5	61.88	59.14	2.5	16.95	38.82	2.6	30.21	16.61	2.6	8.60	1.52
3.5	43.56	37.91	3.5	61.89	59.48	3.5	17.02	39.11	3.6	30.29	16.93	3.6	8.70	1.72
4.5	43.56	38.21	4.5	61.85	59.83	4.5	17.10	39.41	4.6	30.34	17.26	4.6	8.80	1.92
5.5	43.59	38.53	5.5	61.77	60.19	5.5	17.18	39.70	5.6	30.41	17.60	5.6	8.91	2.11
6.5	43.62	38.85	6.5	61.67	60.54	6.5	17.28	39.99	6.6	30.47	17.94	6.6	9.03	2.30
7.5	43.64	39.18	7.5	61.55	60.87	7.5	17.38	40.31	7.6	30.52	18.28	7.6	9.17	2.52
8.5	43.67	39.54	8.5	61.41	61.17	8.5	17.49	40.63	8.6	30.56	18.61	8.6	9.30	2.74
9.5	43.70	39.92	9.5	61.28	61.46	9.5	17.59	40.98	9.6	30.60	18.90	9.6	9.43	2.98
10.5	43.71	40.29	10.5	61.17	61.73	10.5	17.68	41.35	10.6	30.64	19.19	10.6	9.56	3.25
11.5	43.70	40.67	11.5	61.07	61.99	11.5	17.74	41.73	11.6	30.68	19.47	11.6	9.68	3.52
12.5	43.67	41.04	12.5	60.99	62.27	12.5	17.79	42.10	12.6	30.72	19.75	12.6	9.78	3.82
13.5	43.63	41.40	13.5	60.93	62.54	13.5	17.83	42.46	13.6	30.77	20.02	13.6	9.87	4.12
14.4	43.59	41.73	14.5	60.86	62.85	14.5	17.84	42.81	14.6	30.82	20.30	14.6	9.96	4.41
15.4	43.55	42.05	15.5	60.77	63.17	15.5	17.86	43.14	15.6	30.88	20.62	15.6	10.03	4.67
16.4	43.51	42.33	16.5	60.65	63.50	16.5	17.89	43.43	16.6	30.92	20.97	16.6	10.11	4.91
17.4	43.48	42.61	17.5	60.49	63.83	17.5	17.92	43.72	17.6	30.96	21.32	17.6	10.18	5.13
18.4	43.47	42.90	18.5	60.31	64.18	18.5	17.96	44.01	18.5	30.99	21.69	18.6	10.27	5.36
19.4	43.46	43.20	19.5	60.08	64.50	19.5	18.01	44.31	19.5	31.00	22.07	19.6	10.36	5.57
20.4	43.46	43.52	20.5	59.83	64.81	20.5	18.07	44.62	20.5	31.01	22.42	20.6	10.47	5.80
21.4	43.45	43.85	21.5	59.58	65.10	21.5	18.13	44.95	21.5	31.01	22.76	21.6	10.58	6.05
22.4	43.43	44.20	22.5	59.34	65.38	22.5	18.19	45.30	22.5	31.02	23.09	22.6	10.68	6.31
23.4	43.40	44.54	23.5	59.11	65.64	23.5	18.23	45.66	23.5	31.02	23.40	23.5	10.78	6.60
24.4	43.35	44.89	24.5	58.90	65.88	24.5	18.24	46.03	24.5	31.03	23.70	24.5	10.87	6.92
25.4	43.30	45.23	25.5	58.71	66.14	25.5	18.25	46.39	25.5	31.04	24.00	25.5	10.95	7.23
26.4	43.23	45.56	26.4	58.52	66.41	26.5	18.24	46.73	26.5	31.06	24.29	26.5	11.02	7.54
27.4	43.15	45.86	27.4	58.35	66.67	27.5	18.21	47.08	27.5	31.07	24.59	27.5	11.07	7.84
28.4	43.07	46.14	28.4	58.15	66.94	28.5	18.18	47.41	28.5	31.08	24.91	28.5	11.12	8.13
29.4	42.99	46.41	29.4	57.93	67.22	29.5	18.15	47.71	29.5	31.09	25.24	29.5	11.17	8.42
30.4	42.91	46.67	30.4	57.71	67.51	30.5	18.14	47.99	30.5	31.10	25.58	30.5	11.22	8.68
31.4	42.85	46.91	31.4	57.44	67.82	31.4	18.12	48.26	31.5	31.10	25.94	31.5	11.26	8.94
32.4	42.80	47.16	32.4	57.14	68.13	32.4	18.11	48.54	32.5	31.10	26.31	32.5	11.32	9.18
8.56	-8.51		23.40	+23.38		9.89	-9.84		7.34	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup>	27°.793		15 <sup>h</sup> 3 <sup>m</sup>	41°.175		15 <sup>h</sup> 23 <sup>m</sup>	56°.594		16 <sup>h</sup> 54 <sup>m</sup>	25°.488		17 <sup>h</sup> 15 <sup>m</sup>	54°.896	
-83° 17'	21''.03		+87° 33'	10''.52		-84° 11'	30''.39		+82° 10'	32''.75		-80° 47'	6''.56	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursæ Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursæ Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "
May	17 59	+86 36	May	18 6	-87 39	May	19 2	+89 0	May	19 29	-89 13	May	20 48	+82 13
1.6	4.15	34.32	1.6	56.37	39.73	1.7	26.83	45.93	1.7	22.71	7.94	1.8	37.31	16.50
2.6	4.42	34.55	2.6	56.84	39.91	2.7	27.98	46.10	2.7	24.30	8.01	2.8	37.48	16.53
3.6	4.69	34.81	3.6	57.29	40.07	3.7	29.12	46.28	3.7	25.84	8.08	3.8	37.66	16.57
4.6	4.94	35.08	4.6	57.75	40.22	4.7	30.24	46.47	4.7	27.41	8.11	4.7	37.83	16.62
5.6	5.18	35.37	5.6	58.22	40.36	5.7	31.30	46.71	5.7	28.99	8.14	5.7	38.01	16.72
6.6	5.39	35.68	6.6	58.72	40.50	6.7	32.30	46.95	6.7	30.65	8.18	6.7	38.18	16.84
7.6	5.58	35.97	7.6	59.26	40.66	7.7	33.21	47.19	7.7	32.39	8.22	7.7	38.35	16.97
8.6	5.76	36.27	8.6	59.81	40.83	8.7	34.03	47.42	8.7	34.23	8.27	8.7	38.50	17.10
9.6	5.91	36.54	9.6	60.38	41.02	9.7	34.79	47.66	9.7	36.14	8.33	9.7	38.65	17.23
10.6	6.06	36.79	10.6	60.94	41.25	10.7	35.52	47.85	10.7	38.05	8.42	10.7	38.80	17.34
11.6	6.21	37.03	11.6	61.47	41.50	11.7	36.25	48.04	11.7	39.94	8.55	11.7	38.93	17.44
12.6	6.39	37.27	12.6	61.97	41.77	12.7	37.02	48.23	12.7	41.75	8.68	12.7	39.07	17.53
13.6	6.58	37.50	13.6	62.41	42.02	13.7	37.85	48.40	13.7	43.43	8.83	13.7	39.22	17.61
14.6	6.77	37.75	14.6	62.81	42.26	14.8	38.76	48.59	14.7	44.99	8.98	14.7	39.36	17.69
15.6	6.97	38.02	15.6	63.19	42.50	15.6	39.70	48.82	15.7	46.45	9.12	15.7	39.51	17.78
16.6	7.17	38.32	16.6	63.56	42.71	16.6	40.66	49.05	16.7	47.84	9.24	16.7	39.69	17.90
17.6	7.36	38.65	17.6	63.93	42.91	17.6	41.60	49.32	17.7	49.22	9.34	17.7	39.86	18.05
18.6	7.52	38.98	18.6	64.34	43.10	18.6	42.47	49.61	18.7	50.65	9.42	18.7	40.03	18.23
19.6	7.66	39.33	19.6	64.76	43.28	19.6	43.25	49.91	19.7	52.17	9.51	19.7	40.18	18.41
20.6	7.76	39.67	20.6	65.21	43.47	20.6	43.93	50.21	20.7	53.77	9.60	20.7	40.33	18.61
21.6	7.86	40.00	21.6	65.68	43.69	21.6	44.55	50.50	21.6	55.43	9.72	21.7	40.48	18.82
22.6	7.95	40.32	22.6	66.15	43.92	22.6	45.12	50.78	22.6	57.12	9.85	22.7	40.62	19.01
23.6	8.04	40.60	23.6	66.59	44.19	23.6	45.67	51.03	23.6	58.81	9.98	23.7	40.75	19.19
24.6	8.13	40.89	24.6	67.01	44.45	24.6	46.23	51.28	24.6	60.44	10.15	24.7	40.88	19.37
25.6	8.23	41.16	25.6	67.40	44.73	25.6	46.82	51.51	25.6	62.00	10.34	25.7	41.02	19.52
26.6	8.33	41.43	26.6	67.76	45.01	26.6	47.43	51.74	26.6	63.49	10.54	26.7	41.15	19.68
27.6	8.44	41.72	27.6	68.08	45.30	27.6	48.07	51.99	27.6	64.88	10.74	27.7	41.28	19.82
28.6	8.55	42.02	28.6	68.37	45.58	28.6	48.75	52.26	28.6	66.19	10.95	28.7	41.41	19.99
29.6	8.66	42.32	29.6	68.66	45.86	29.6	49.44	52.52	29.6	67.43	11.14	29.7	41.55	20.16
30.6	8.78	42.64	30.6	68.93	46.11	30.6	50.14	52.80	30.6	68.63	11.32	30.7	41.69	20.35
31.6	8.88	42.99	31.6	69.20	46.35	31.6	50.80	53.11	31.6	69.80	11.50	31.7	41.84	20.58
32.6	8.97	43.35	32.6	69.48	46.59	32.6	51.42	53.43	32.6	71.00	11.65	32.7	41.99	20.81
16.91	+16.88		24.51	-24.49		58.09	+58.08		73.38	-73.38		7.39	+7.32	
17 <sup>h</sup> 59 <sup>m</sup>	1° 30'7"		18 <sup>h</sup> 6 <sup>m</sup>	11° 8'93"		19 <sup>h</sup> 2 <sup>m</sup>	39° 6'24"		19 <sup>h</sup> 27 <sup>m</sup>	42° 2'18"		20 <sup>h</sup> 48 <sup>m</sup>	40° 4'94"	
+86° 36'	51° 17'		-87° 39'	51° 82'		+89° 1'	2° 17'		-89° 13'	28° 57'		+82° 13'	29° 86'	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
May	h m    ° ' "	-83 5	May	h m    ° ' "	-86 22	May	h m    ° ' "	-81 48	May	h m    ° ' "	+86 50	May	h m    ° ' "	-82 28
	s	"		s	"		s	"		s	"		s	"
1.8	24.74	39.60	1.8	11.79	58.69	1.8	40.22	34.54	1.9	26.42	55.55	1.9	13.23	22.28
2.8	24.91	39.46	2.8	12.11	58.51	2.8	40.35	34.35	2.9	26.75	55.35	2.9	13.33	22.01
3.8	25.08	39.33	3.8	12.40	58.34	3.8	40.48	34.13	3.9	27.12	55.15	3.9	13.43	21.74
4.8	25.25	39.18	4.8	12.69	58.15	4.8	40.59	33.91	4.9	27.48	54.98	4.9	13.53	21.47
5.8	25.42	39.04	5.8	12.98	57.97	5.8	40.71	33.70	5.9	27.86	54.84	5.9	13.63	21.18
6.8	25.60	38.88	6.8	13.27	57.74	6.8	40.84	33.46	6.9	28.27	54.69	6.9	13.73	20.87
7.8	25.78	38.71	7.8	13.59	57.53	7.8	40.97	33.22	7.9	28.66	54.59	7.9	13.83	20.56
8.8	25.99	38.55	8.8	13.94	57.31	8.8	41.13	32.98	8.8	29.04	54.49	8.9	13.95	20.25
9.8	26.20	38.40	9.8	14.30	57.11	9.8	41.30	32.73	9.8	29.39	54.42	9.9	14.08	19.91
10.8	26.43	38.27	10.8	14.69	56.91	10.8	41.47	32.49	10.8	29.72	54.34	10.9	14.23	19.59
11.8	26.65	38.15	11.8	15.11	56.75	11.8	41.65	32.29	11.8	30.04	54.26	11.9	14.38	19.29
12.8	26.88	38.06	12.8	15.49	56.61	12.8	41.82	32.11	12.8	30.34	54.16	12.9	14.54	19.00
13.8	27.09	38.00	13.8	15.88	56.50	13.8	41.99	31.96	13.8	30.65	54.03	13.8	14.69	18.76
14.8	27.28	37.95	14.8	16.24	56.39	14.8	42.14	31.82	14.8	30.98	53.91	14.8	14.83	18.53
15.8	27.47	37.90	15.8	16.57	56.28	15.8	42.28	31.68	15.8	31.35	53.77	15.8	14.97	18.31
16.8	27.65	37.82	16.8	16.88	56.17	16.8	42.42	31.53	16.8	31.74	53.65	16.8	15.10	18.09
17.7	27.82	37.74	17.8	17.18	56.06	17.8	42.55	31.37	17.8	32.16	53.55	17.8	15.20	17.87
18.7	27.99	37.65	18.8	17.49	55.93	18.8	42.68	31.20	18.8	32.59	53.47	18.8	15.32	17.64
19.7	28.18	37.55	19.8	17.80	55.78	19.8	42.81	31.03	19.8	33.03	53.42	19.8	15.44	17.37
20.7	28.36	37.44	20.8	18.13	55.64	20.8	42.97	30.85	20.8	33.46	53.39	20.8	15.57	17.11
21.7	28.57	37.34	21.8	18.50	55.49	21.8	43.14	30.66	21.8	33.86	53.37	21.8	15.70	16.84
22.7	28.79	37.25	22.8	18.87	55.35	22.8	43.31	30.47	22.8	34.24	53.36	22.8	15.85	16.57
23.7	28.99	37.19	23.8	19.26	55.24	23.8	43.48	30.31	23.8	34.61	53.35	23.8	16.02	16.32
24.7	29.22	37.14	24.8	19.66	55.14	24.8	43.66	30.17	24.8	34.96	53.31	24.8	16.19	16.09
25.7	29.44	37.12	25.8	20.05	55.05	25.8	43.83	30.05	25.8	35.30	53.28	25.8	16.35	15.86
26.7	29.64	37.11	26.7	20.43	55.01	26.8	44.01	29.95	26.8	35.66	53.24	26.8	16.52	15.66
27.7	29.84	37.12	27.7	20.81	54.98	27.8	44.17	29.87	27.8	36.01	53.19	27.8	16.68	15.47
28.7	30.03	37.14	28.7	21.17	54.94	28.8	44.33	29.80	28.8	36.37	53.14	28.8	16.84	15.29
29.7	30.22	37.15	29.7	21.51	54.91	29.8	44.48	29.73	29.8	36.76	53.10	29.8	16.98	15.14
30.7	30.39	37.15	30.7	21.83	54.87	30.8	44.62	29.66	30.8	37.17	53.06	30.8	17.12	14.99
31.7	30.56	37.16	31.7	22.15	54.82	31.8	44.77	29.57	31.8	37.60	53.04	31.8	17.26	14.82
32.7	30.73	37.15	32.7	22.45	54.78	32.7	44.91	29.49	32.8	38.05	53.04	32.8	17.39	14.66
8.32	-8.26		15.85	-15.82		7.02	-6.95		18.19	+18.16		7.63	-7.57	
21 <sup>h</sup> 38 <sup>m</sup>	19 <sup>s</sup> .542		22 <sup>h</sup> 16 <sup>m</sup>	8 <sup>s</sup> .656		22 <sup>h</sup> 37 <sup>m</sup>	39 <sup>s</sup> .016		23 <sup>h</sup> 27 <sup>m</sup>	44 <sup>s</sup> .125		23 <sup>h</sup> 47 <sup>m</sup>	16 <sup>s</sup> .424	
-83° 6'	6''99		-86° 23'	27''13		-81° 49'	2''34		+86° 50'	58''89		-82° 28'	48''42	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	" '		h m	" '		h m	" '		h m	" '		h m	" '
June	0 57	+85 48	June	1 29	+88 51	June	1 41	-85 10	June	4 9	+85 20	June	5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.8	3.46	42.60	0.9	44.75	42.23	0.9	49.73	53.13	0.9	58.36	15.00	1.0	10.63	37.35
1.8	3.77	42.47	1.9	45.76	42.03	1.9	49.86	52.86	1.9	58.46	14.67	2.0	10.62	37.01
2.8	4.08	42.35	2.9	46.84	41.87	2.9	49.98	52.59	2.9	58.58	14.34	3.0	10.63	36.64
3.8	4.41	42.25	3.9	47.95	41.72	3.9	50.10	52.32	3.9	58.72	14.05	4.0	10.67	36.29
4.8	4.73	42.18	4.9	49.04	41.60	4.9	50.22	52.01	4.9	58.87	13.76	5.0	10.73	35.97
5.8	5.05	42.13	5.9	50.10	41.50	5.9	50.36	51.70	5.9	59.04	13.51	6.0	10.79	35.68
6.8	5.34	42.10	6.9	51.11	41.42	6.9	50.54	51.38	6.9	59.19	13.27	7.0	10.86	35.39
7.8	5.61	42.06	7.9	52.05	41.35	7.9	50.72	51.06	7.9	59.34	13.03	8.0	10.92	35.14
8.8	5.88	42.02	8.8	52.93	41.25	8.9	50.92	50.76	8.9	59.47	12.81	9.0	10.98	34.88
9.8	6.12	41.97	9.8	53.78	41.15	9.9	51.12	50.48	9.9	59.57	12.58	10.0	11.00	34.61
10.8	6.39	41.87	10.8	54.65	41.03	10.9	51.33	50.23	10.9	59.68	12.33	11.0	11.01	34.34
11.8	6.65	41.78	11.8	55.57	40.89	11.8	51.54	49.99	11.9	59.78	12.05	12.0	11.02	34.03
12.8	6.94	41.69	12.8	56.58	40.75	12.8	51.72	49.79	12.9	59.90	11.76	13.0	11.05	33.71
13.8	7.26	41.63	13.8	57.67	40.61	13.8	51.89	49.59	13.9	60.03	11.44	14.0	11.09	33.36
14.8	7.60	41.56	14.8	58.84	40.48	14.8	52.04	49.37	14.9	60.20	11.15	15.0	11.14	33.02
15.8	7.94	41.51	15.8	60.05	40.38	15.8	52.19	49.15	15.9	60.38	10.86	15.9	11.22	32.68
16.8	8.30	41.49	16.8	61.27	40.31	16.8	52.36	48.93	16.9	60.57	10.58	16.9	11.31	32.33
17.8	8.63	41.49	17.8	62.46	40.25	17.8	52.53	48.68	17.9	60.78	10.34	17.9	11.42	32.01
18.8	8.96	41.51	18.8	63.60	40.21	18.8	52.71	48.44	18.9	60.99	10.09	18.9	11.54	31.71
19.8	9.28	41.53	19.8	64.70	40.18	19.8	52.91	48.18	19.9	61.19	9.88	19.9	11.65	31.43
20.8	9.56	41.55	20.8	65.73	40.16	20.8	53.14	47.94	20.9	61.38	9.68	20.9	11.76	31.16
21.8	9.85	41.56	21.8	66.72	40.12	21.8	53.37	47.71	21.9	61.55	9.48	21.9	11.86	30.90
22.8	10.13	41.57	22.8	67.69	40.09	22.8	53.61	47.51	22.9	61.72	9.25	22.9	11.95	30.63
23.8	10.40	41.58	23.8	68.67	40.05	23.8	53.83	47.31	23.9	61.88	9.04	23.9	12.03	30.37
24.8	10.68	41.58	24.8	69.67	39.99	24.8	54.07	47.14	24.9	62.05	8.82	24.9	12.11	30.08
25.8	10.97	41.57	25.8	70.69	39.94	25.8	54.29	46.99	25.9	62.21	8.58	25.9	12.19	29.80
26.8	11.27	41.55	26.8	71.77	39.87	26.8	54.52	46.85	26.9	62.38	8.35	26.9	12.26	29.49
27.8	11.59	41.54	27.8	72.91	39.80	27.8	54.71	46.71	27.9	62.56	8.09	27.9	12.35	29.18
28.8	11.92	41.55	28.8	74.10	39.74	28.8	54.92	46.57	28.9	62.76	7.82	28.9	12.46	28.86
29.8	12.26	41.59	29.8	75.34	39.70	29.8	55.11	46.41	29.9	62.98	7.58	29.9	12.59	28.54
30.8	12.63	41.64	30.8	76.61	39.69	30.8	55.31	46.26	30.9	63.23	7.34	30.9	12.73	28.21
31.8	12.97	41.73	31.8	77.89	39.69	31.8	55.50	46.08	31.9	63.49	7.12	31.9	12.91	27.91
13.69	+13.66		50.32	+50.31		11.90	-11.86		12.30	+12.26		11.85	+11.81	
0 <sup>h</sup> 57 <sup>m</sup>	9 <sup>s</sup> .300		1 <sup>h</sup> 30 <sup>m</sup>	13 <sup>s</sup> .156		1 <sup>h</sup> 42 <sup>m</sup>	2 <sup>s</sup> .339		4 <sup>h</sup> 10 <sup>m</sup>	2 <sup>s</sup> .561		5 <sup>h</sup> 35 <sup>m</sup>	12 <sup>s</sup> .782	
+85° 48'	45'' .30		+88° 51'	43'' .55		-85° 11'	21'' .46		+85° 20'	10'' .34		+85° 9'	30'' .24	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m	° '	June	h m	° '	June	h m	° '	June	h m	° '	June	h m	° '
	5 45	-84 49		6 46	-80 43		7 2	+87 10		7 13	+82 34		7 15	-86 54
	s	"		s	"		s	"		s	"		s	"
1.0	51.78	49.52	1.1	47.50	49.76	1.1	2.96	63.42	1.1	43.46	38.61	1.1	44.76	22.18
2.0	51.68	49.27	2.1	47.42	49.54	2.1	2.77	63.09	2.1	43.39	38.31	2.1	44.48	22.00
3.0	51.57	49.03	3.1	47.34	49.33	3.1	2.62	62.75	3.1	43.33	38.00	3.1	44.19	21.81
4.0	51.46	48.75	4.1	47.26	49.11	4.1	2.49	62.41	4.1	43.28	37.68	4.1	43.88	21.64
5.0	51.33	48.47	5.1	47.17	48.88	5.1	2.40	62.08	5.1	43.24	37.38	5.1	43.57	21.46
6.0	51.21	48.15	6.1	47.08	48.62	6.1	2.33	61.78	6.1	43.22	37.09	6.1	43.23	21.25
7.0	51.10	47.83	7.1	46.99	48.35	7.1	2.28	61.49	7.1	43.21	36.82	7.1	42.89	21.02
8.0	50.99	47.48	8.1	46.91	48.05	8.1	2.24	61.23	8.1	43.19	36.57	8.1	42.56	20.76
9.0	50.90	47.13	9.1	46.83	47.73	9.1	2.16	60.97	9.1	43.16	36.32	9.1	42.26	20.49
10.0	50.84	46.78	10.1	46.76	47.40	10.1	2.06	60.71	10.1	43.12	36.07	10.1	41.98	20.21
11.0	50.79	46.44	11.1	46.70	47.07	11.1	1.93	60.43	11.1	43.07	35.81	11.1	41.74	19.92
12.0	50.74	46.11	12.1	46.65	46.79	12.1	1.80	60.14	12.1	43.02	35.54	12.1	41.53	19.64
13.0	50.70	45.83	13.1	46.60	46.51	13.1	1.65	59.83	13.1	42.96	35.24	13.1	41.33	19.40
14.0	50.65	45.54	14.1	46.55	46.26	14.1	1.53	59.49	14.1	42.91	34.92	14.1	41.14	19.17
15.0	50.60	45.27	15.1	46.50	46.02	15.1	1.43	59.15	15.1	42.86	34.59	15.1	40.93	18.95
16.0	50.55	45.01	16.0	46.44	45.78	16.1	1.37	58.79	16.1	42.84	34.26	16.1	40.71	18.74
17.0	50.48	44.74	17.0	46.39	45.54	17.1	1.34	58.44	17.1	42.83	33.91	17.1	40.47	18.52
18.0	50.42	44.43	18.0	46.33	45.28	18.1	1.34	58.10	18.1	42.83	33.56	18.1	40.22	18.29
18.9	50.36	44.11	19.0	46.27	44.98	19.1	1.35	57.77	19.1	42.84	33.25	19.1	39.98	18.04
19.9	50.30	43.77	20.0	46.21	44.66	20.0	1.38	57.46	20.1	42.84	32.96	20.1	39.73	17.77
20.9	50.26	43.41	21.0	46.15	44.31	21.0	1.41	57.16	21.1	42.85	32.69	21.1	39.50	17.48
21.9	50.23	43.05	22.0	46.11	43.97	22.0	1.42	56.87	22.1	42.85	32.41	22.1	39.30	17.19
22.9	50.22	42.69	23.0	46.07	43.63	23.0	1.42	56.58	23.0	42.85	32.13	23.0	39.10	16.88
23.9	50.22	42.35	24.0	46.03	43.29	24.0	1.40	56.29	24.0	42.84	31.87	24.0	38.94	16.56
24.9	50.22	42.02	25.0	46.00	42.95	25.0	1.37	56.00	25.0	42.84	31.59	25.0	38.79	16.26
25.9	50.23	41.71	26.0	45.98	42.62	26.0	1.34	55.69	26.0	42.82	31.31	26.0	38.66	15.97
26.9	50.24	41.38	27.0	45.97	42.33	27.0	1.31	55.37	27.0	42.80	31.00	27.0	38.54	15.69
27.9	50.26	41.10	28.0	45.94	42.04	28.0	1.29	55.04	28.0	42.79	30.66	28.0	38.42	15.41
28.9	50.27	40.83	29.0	45.91	41.76	29.0	1.28	54.69	29.0	42.78	30.32	29.0	38.31	15.15
29.9	50.29	40.56	30.0	45.89	41.49	30.0	1.32	54.33	30.0	42.79	29.96	30.0	38.19	14.90
30.9	50.29	40.27	31.0	45.87	41.22	31.0	1.39	53.96	31.0	42.82	29.60	31.0	38.06	14.65
31.9	50.28	39.96	32.0	45.85	40.95	32.0	1.50	53.59	32.0	42.86	29.25	32.0	37.92	14.39
11.10	-11.05		6.21	-6.13		20.35	+20.32		7.74	+7.67		18.52	-18.50	
5 <sup>h</sup> 46 <sup>m</sup>	14° 75'		6 <sup>h</sup> 46 <sup>m</sup>	58° 54'		7 <sup>h</sup> 2 <sup>m</sup>	4° 04'		7 <sup>h</sup> 13 <sup>m</sup>	42° 29'		7 <sup>h</sup> 16 <sup>m</sup>	20° 29'	
-84° 49'	46'' 89		-80° 43'	38'' 16		+87° 10'	54'' 74		+82° 34'	30'' 13		-86° 54'	6'' 70	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleonis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m 8 15	° ' +88 53	June	h m 9 8	° ' -85 20	June	h m 9 25	° ' +81 41	June	h m 9 36	° ' -80 34	June	h m 10 21	° ' +82 58
	s "	"		s "	"		s "	"		s "	"		s "	"
1.2	52.28	9.38	1.2	43.97	25.58	1.2	25.39	49.50	1.2	18.02	37.13	1.2	9.84	61.17
2.1	51.46	9.11	2.2	43.74	25.53	2.2	25.25	49.33	2.2	17.91	37.10	2.2	9.66	61.08
3.1	50.70	8.84	3.2	43.51	25.49	3.2	25.12	49.15	3.2	17.80	37.09	3.2	9.48	60.98
4.1	50.03	8.55	4.2	43.27	25.46	4.2	25.01	48.95	4.2	17.68	37.09	4.2	9.33	60.85
5.1	49.44	8.26	5.2	43.01	25.41	5.2	24.91	48.73	5.2	17.56	37.10	5.2	9.18	60.70
6.1	48.93	7.97	6.2	42.75	25.34	6.2	24.82	48.53	6.2	17.44	37.07	6.2	9.04	60.56
7.1	48.46	7.72	7.2	42.47	25.27	7.2	24.73	48.35	7.2	17.31	37.02	7.2	8.92	60.42
8.1	48.00	7.48	8.2	42.19	25.18	8.2	24.65	48.18	8.2	17.18	36.95	8.2	8.80	60.29
9.1	47.52	7.25	9.2	41.91	25.04	9.2	24.57	48.03	9.2	17.04	36.86	9.2	8.68	60.19
10.1	46.99	7.03	10.2	41.64	24.89	10.2	24.48	47.88	10.2	16.90	36.73	10.2	8.55	60.10
11.1	46.39	6.80	11.2	41.40	24.73	11.2	24.38	47.73	11.2	16.78	36.61	11.2	8.42	60.01
12.1	45.74	6.58	12.2	41.18	24.59	12.2	24.25	47.57	12.2	16.67	36.48	12.2	8.26	59.92
13.1	45.02	6.29	13.2	40.98	24.45	13.2	24.13	47.40	13.2	16.57	36.36	13.2	8.09	59.80
14.1	44.34	5.98	14.2	40.78	24.32	14.2	24.01	47.20	14.2	16.47	36.26	14.2	7.91	59.67
15.1	43.71	5.67	15.1	40.58	24.21	15.2	23.90	46.96	15.2	16.37	36.17	15.2	7.74	59.51
16.1	43.14	5.34	16.1	40.37	24.11	16.2	23.79	46.71	16.2	16.28	36.09	16.2	7.59	59.33
17.1	42.67	5.01	17.1	40.15	24.02	17.2	23.70	46.46	17.2	16.18	36.02	17.2	7.44	59.14
18.1	42.29	4.68	18.1	39.91	23.89	18.2	23.61	46.22	18.2	16.07	35.94	18.2	7.30	58.94
19.1	41.96	4.37	19.1	39.68	23.76	19.2	23.54	45.98	19.2	15.95	35.84	19.2	7.18	58.73
20.1	41.66	4.07	20.1	39.45	23.62	20.1	23.48	45.73	20.2	15.83	35.72	20.2	7.08	58.54
21.1	41.37	3.79	21.1	39.21	23.44	21.1	23.41	45.49	21.2	15.71	35.58	21.2	6.97	58.36
22.1	41.05	3.50	22.1	38.98	23.26	22.1	23.33	45.29	22.1	15.59	35.41	22.2	6.85	58.19
23.1	40.70	3.24	23.1	38.77	23.06	23.1	23.26	45.09	23.1	15.48	35.23	23.2	6.73	58.03
24.1	40.34	2.97	24.1	38.57	22.85	24.1	23.19	44.89	24.1	15.37	35.04	24.2	6.61	57.87
25.1	39.94	2.70	25.1	38.37	22.64	25.1	23.10	44.67	25.1	15.26	34.84	25.2	6.49	57.72
26.1	39.51	2.42	26.1	38.18	22.43	26.1	23.02	44.45	26.1	15.16	34.66	26.2	6.35	57.55
27.1	39.08	2.11	27.1	38.00	22.22	27.1	22.92	44.23	27.1	15.07	34.47	27.2	6.20	57.36
28.1	38.64	1.80	28.1	37.83	22.03	28.1	22.82	43.98	28.1	14.98	34.28	28.2	6.06	57.16
29.1	38.24	1.47	29.1	37.65	21.84	29.1	22.73	43.71	29.1	14.90	34.11	29.2	5.91	56.94
30.1	37.92	1.10	30.1	37.49	21.66	30.1	22.64	43.41	30.1	14.82	33.97	30.2	5.78	56.71
31.1	37.65	0.72	31.1	37.32	21.48	31.1	22.59	43.09	31.1	14.74	33.83	31.2	5.64	56.45
32.1	37.49	0.36	32.1	37.15	21.32	32.1	22.52	42.77	32.1	14.64	33.68	32.2	5.54	56.18
51.39	+51.38		12.31	-12.27		6.92	+6.85		6.11	-6.03		8.19	+8.12	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".07		



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

7 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			1 Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			K Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m    ° ' "		June	h m    ° ' "		June	h m    ° ' "		June	h m    ° ' "		June	h m    ° ' "	
	10 59   -84 9			12 14   +88 9			12 46   -84 40			12 48   +83 51			13 27   -85 22	
	s        "        "			s        "        "			s        "        "			s        "        "			s        "        "	
1.3	54.59   24.73	1.3	47.44   40.21	1.3	17.45   54.91	1.3	38.04   53.08	1.4	30.68   12.27					
2.3	54.43   24.82	2.3	46.71   40.28	2.3	17.32   55.11	2.3	37.84   53.22	2.4	30.56   12.51					
3.3	54.25   24.91	3.3	45.99   40.33	3.3	17.19   55.33	3.3	37.64   53.32	3.4	30.45   12.77					
4.3	54.09   25.03	4.3	45.28   40.37	4.3	17.06   55.56	4.3	37.43   53.41	4.4	30.34   13.04					
5.3	53.90   25.14	5.3	44.60   40.38	5.3	16.92   55.79	5.3	37.24   53.47	5.4	30.21   13.31					
6.3	53.70   25.25	6.3	43.97   40.37	6.3	16.75   56.03	6.3	37.06   53.52	6.4	30.06   13.60					
7.2	53.49   25.35	7.3	43.35   40.36	7.3	16.58   56.27	7.3	36.90   53.56	7.4	29.90   13.88					
8.2	53.26   25.42	8.3	42.78   40.35	8.3	16.39   56.50	8.3	36.74   53.61	8.3	29.72   14.16					
9.2	53.03   25.47	9.3	42.24   40.38	9.3	16.19   56.70	9.3	36.59   53.69	9.3	29.52   14.41					
10.2	52.81   25.49	10.3	41.66   40.42	10.3	15.98   56.88	10.3	36.43   53.78	10.3	29.30   14.62					
11.2	52.60   25.48	11.3	41.06   40.46	11.3	15.77   57.02	11.3	36.26   53.87	11.3	29.09   14.82					
12.2	52.41   25.47	12.3	40.41   40.50	12.3	15.57   57.15	12.3	36.07   53.97	12.3	28.90   15.02					
13.2	52.22   25.45	13.3	39.71   40.54	13.3	15.39   57.29	13.3	35.87   54.06	13.3	28.71   15.19					
14.2	52.04   25.45	14.3	38.97   40.57	14.3	15.24   57.41	14.3	35.65   54.16	14.3	28.56   15.35					
15.2	51.88   25.47	15.3	38.21   40.57	15.3	15.09   57.53	15.3	35.43   54.23	15.3	28.40   15.52					
16.2	51.71   25.50	16.3	37.46   40.54	16.3	14.93   57.68	16.3	35.21   54.27	16.3	28.26   15.72					
17.2	51.54   25.53	17.3	36.71   40.51	17.3	14.78   57.84	17.3	35.01   54.28	17.3	28.09   15.93					
18.2	51.35   25.57	18.3	36.02   40.46	18.3	14.61   58.01	18.3	34.81   54.28	18.3	27.92   16.13					
19.2	51.16   25.61	19.3	35.37   40.37	19.3	14.43   58.18	19.3	34.62   54.27	19.3	27.75   16.34					
20.2	50.95   25.63	20.3	34.76   40.30	20.3	14.23   58.34	20.3	34.44   54.26	20.3	27.55   16.55					
21.2	50.73   25.60	21.3	34.16   40.24	21.3	14.02   58.48	21.3	34.27   54.25	21.3	27.32   16.75					
22.2	50.50   25.57	22.3	33.57   40.19	22.3	13.80   58.60	22.3	34.09   54.25	22.3	27.09   16.93					
23.2	50.30   25.52	23.3	32.99   40.15	23.3	13.57   58.69	23.3	33.92   54.26	23.3	26.86   17.08					
24.2	50.09   25.46	24.3	32.39   40.12	24.3	13.35   58.76	24.3	33.74   54.27	24.3	26.63   17.22					
25.2	49.89   25.37	25.3	31.76   40.08	25.3	13.13   58.82	25.3	33.56   54.29	25.3	26.39   17.35					
26.2	49.69   25.28	26.2	31.11   40.03	26.3	12.92   58.89	26.3	33.37   54.31	26.3	26.15   17.45					
27.2	49.51   25.20	27.2	30.43   39.99	27.3	12.73   58.94	27.3	33.16   54.33	27.3	25.94   17.55					
28.2	49.34   25.11	28.2	29.72   39.94	28.3	12.54   58.99	28.3	32.94   54.34	28.3	25.74   17.63					
29.2	49.17   25.05	29.2	28.99   39.89	29.3	12.35   59.06	29.3	32.73   54.33	29.3	25.55   17.73					
30.2	49.01   24.98	30.2	28.26   39.79	30.3	12.18   59.14	30.3	32.51   54.30	30.3	25.36   17.85					
31.2	48.84   24.93	31.2	27.53   39.67	31.3	12.01   59.23	31.3	32.30   54.24	31.3	25.17   17.98					
32.2	48.68   24.89	32.2	26.83   39.53	32.3	11.83   59.31	32.3	32.09   54.16	32.3	24.99   18.13					
9.82	-9.77	31.17	+31.15	10.79	-10.74	9.36	+9.30	12.39	-12.35					
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280		12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425		12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152		12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418		13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624						
-84° 8' 50".60		+88° 9' 36".08		-84° 40' 22".34		+83° 51' 50".47		-85° 21' 42".23						

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "
	14 13	-83 17		15 3	+87 33		15 24	-84 11		16 54	+82 10		17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
1.4	42.80	47.16	1.4	57.14	8.13	1.4	18.11	48.54	1.5	31.10	26.31	1.5	11.32	9.18
2.4	42.75	47.42	2.4	56.82	8.43	2.4	18.10	48.82	2.5	31.07	26.67	2.5	11.38	9.42
3.4	42.70	47.70	3.4	56.47	8.71	3.4	18.11	49.10	3.5	31.05	27.04	3.5	11.45	9.66
4.4	42.66	47.98	4.4	56.11	8.96	4.4	18.12	49.41	4.5	31.01	27.38	4.5	11.52	9.91
5.4	42.61	48.27	5.4	55.74	9.18	5.4	18.13	49.73	5.5	30.98	27.72	5.5	11.61	10.18
6.4	42.56	48.57	6.4	55.38	9.39	6.4	18.14	50.06	6.5	30.93	28.03	6.5	11.69	10.49
7.4	42.48	48.89	7.4	55.05	9.58	7.4	18.11	50.41	7.5	30.89	28.31	7.5	11.75	10.81
8.4	42.39	49.21	8.4	54.74	9.77	8.4	18.08	50.76	8.5	30.86	28.59	8.5	11.80	11.14
9.4	42.30	49.49	9.4	54.45	9.95	9.4	18.03	51.09	9.5	30.83	28.86	9.5	11.85	11.46
10.4	42.17	49.76	10.4	54.17	10.17	10.4	17.95	51.42	10.5	30.80	29.16	10.5	11.88	11.79
11.4	42.05	50.00	11.4	53.88	10.42	11.4	17.87	51.70	11.5	30.78	29.47	11.5	11.89	12.10
12.4	41.95	50.22	12.4	53.56	10.68	12.4	17.80	51.97	12.5	30.75	29.79	12.5	11.90	12.38
13.4	41.85	50.42	13.4	53.21	10.94	13.4	17.74	52.21	13.5	30.72	30.14	13.5	11.93	12.64
14.4	41.76	50.62	14.4	52.82	11.20	14.4	17.68	52.45	14.5	30.68	30.51	14.5	11.95	12.88
15.4	41.68	50.84	15.4	52.40	11.44	15.4	17.65	52.70	15.5	30.62	30.86	15.5	11.98	13.13
16.4	41.60	51.06	16.4	51.95	11.67	16.4	17.61	52.95	16.5	30.56	31.20	16.5	12.02	13.37
17.4	41.53	51.31	17.4	51.50	11.87	17.4	17.57	53.22	17.5	30.49	31.53	17.5	12.07	13.63
18.4	41.45	51.54	18.4	51.04	12.07	18.4	17.54	53.50	18.5	30.41	31.85	18.5	12.11	13.92
19.3	41.36	51.79	19.4	50.62	12.22	19.4	17.49	53.81	19.5	30.35	32.14	19.5	12.15	14.23
20.3	41.25	52.05	20.4	50.21	12.37	20.4	17.42	54.12	20.5	30.29	32.42	20.5	12.18	14.54
21.3	41.13	52.29	21.4	49.83	12.53	21.4	17.34	54.42	21.5	30.21	32.68	21.5	12.21	14.87
22.3	41.00	52.52	22.4	49.45	12.70	22.4	17.25	54.71	22.5	30.15	32.95	22.5	12.22	15.19
23.3	40.86	52.72	23.4	49.07	12.86	23.4	17.13	55.00	23.5	30.09	33.21	23.5	12.22	15.51
24.3	40.72	52.92	24.4	48.70	13.03	24.4	17.01	55.27	24.4	30.03	33.50	24.5	12.21	15.81
25.3	40.58	53.09	25.4	48.31	13.21	25.4	16.89	55.51	25.4	29.97	33.78	25.5	12.20	16.10
26.3	40.44	53.25	26.4	47.90	13.41	26.4	16.79	55.73	26.4	29.91	34.09	26.5	12.17	16.38
27.3	40.31	53.39	27.4	47.48	13.61	27.4	16.68	55.94	27.4	29.83	34.40	27.5	12.15	16.64
28.3	40.17	53.52	28.4	47.02	13.81	28.4	16.57	56.14	28.4	29.75	34.72	28.5	12.14	16.88
29.3	40.07	53.67	29.4	46.54	13.99	29.4	16.47	56.34	29.4	29.67	35.05	29.4	12.14	17.12
30.3	39.96	53.81	30.4	46.03	14.17	30.4	16.39	56.55	30.4	29.57	35.38	30.4	12.14	17.36
31.3	39.86	53.99	31.4	45.51	14.32	31.4	16.31	56.77	31.4	29.47	35.67	31.4	12.15	17.59
32.3	39.75	54.17	32.3	44.98	14.44	32.4	16.23	57.01	32.4	29.37	35.95	32.4	12.16	17.87
8.57	-8.51		23.42	+23.40		9.89	-9.84		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21".03			+87° 33' 10".52			-84° 11' 30".39			+82° 10' 32".75			-80° 47' 6".56		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursæ Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursæ Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m 17 59 s	° ' +86 36 "	June	h m 18 7 s	° ' -87 39 "	June	h m 19 2 s	° ' +89 0 "	June	h m 19 30 s	° ' -89 13 "	June	h m 20 48 s	° ' +82 13 "
1.6	8.97	43.35	1.6	9.48	46.59	1.6	51.42	53.43	1.6	11.00	11.65	1.7	41.99	20.81
2.6	9.02	43.72	2.6	9.78	46.82	2.6	51.96	53.76	2.6	12.23	11.80	2.7	42.14	21.06
3.5	9.06	44.08	3.6	10.10	47.05	3.6	52.42	54.11	3.6	13.52	11.96	3.7	42.28	21.33
4.5	9.06	44.44	4.6	10.46	47.27	4.6	52.78	54.45	4.6	14.91	12.12	4.7	42.40	21.61
5.5	9.05	44.78	5.5	10.82	47.53	5.6	53.07	54.77	5.6	16.37	12.28	5.7	42.53	21.89
6.5	9.03	45.10	6.5	11.19	47.81	6.6	53.30	55.07	6.6	17.86	12.46	6.7	42.63	22.14
7.5	9.01	45.39	7.5	11.52	48.12	7.6	53.51	55.36	7.6	19.32	12.69	7.7	42.73	22.39
8.5	9.01	45.67	8.5	11.82	48.45	8.6	53.73	55.63	8.6	20.72	12.93	8.7	42.83	22.62
9.5	9.01	45.95	9.5	12.09	48.77	9.6	54.03	55.90	9.6	22.01	13.17	9.7	42.93	22.84
10.5	9.04	46.24	10.5	12.30	49.10	10.6	54.39	56.17	10.6	23.15	13.45	10.6	43.03	23.07
11.5	9.07	46.55	11.5	12.47	49.41	11.6	54.79	56.46	11.6	24.16	13.70	11.6	43.16	23.29
12.5	9.09	46.88	12.5	12.62	49.69	12.6	55.22	56.77	12.6	25.08	13.94	12.6	43.28	23.53
13.5	9.10	47.24	13.5	12.77	49.95	13.6	55.63	57.10	13.6	25.96	14.14	13.6	43.40	23.81
14.5	9.11	47.61	14.5	12.94	50.19	14.6	55.99	57.46	14.6	26.87	14.35	14.6	43.53	24.11
15.5	9.08	47.98	15.5	13.14	50.44	15.6	56.26	57.82	15.6	27.82	14.54	15.6	43.64	24.43
16.5	9.04	48.35	16.5	13.36	50.68	16.6	56.44	58.20	16.6	28.86	14.74	16.6	43.75	24.75
17.5	8.96	48.71	17.5	13.59	50.95	17.6	56.54	58.56	17.6	29.97	14.94	17.6	43.85	25.08
18.5	8.87	49.05	18.5	13.83	51.22	18.6	56.56	58.90	18.6	31.10	15.16	18.6	43.95	25.40
19.5	8.78	49.37	19.5	14.06	51.53	19.5	56.56	59.23	19.6	32.24	15.41	19.6	44.04	25.71
20.5	8.69	49.67	20.5	14.25	51.85	20.5	56.56	59.55	20.6	33.34	15.68	20.6	44.12	26.00
21.5	8.61	49.96	21.5	14.42	52.18	21.5	56.56	59.83	21.6	34.39	15.95	21.6	44.19	26.29
22.5	8.53	50.26	22.5	14.56	52.51	22.5	56.59	60.13	22.6	35.32	16.23	22.6	44.27	26.55
23.5	8.47	50.55	23.5	14.66	52.84	23.5	56.67	60.42	23.6	36.17	16.51	23.6	44.35	26.82
24.5	8.42	50.86	24.5	14.72	53.16	24.5	56.75	60.73	24.6	36.93	16.81	24.6	44.44	27.10
25.5	8.36	51.17	25.5	14.77	53.47	25.5	56.87	61.04	25.6	37.60	17.11	25.6	44.52	27.38
26.5	8.30	51.48	26.5	14.81	53.77	26.5	56.98	61.35	26.5	38.20	17.38	26.6	44.61	27.66
27.5	8.21	51.82	27.5	14.84	54.05	27.5	57.09	61.70	27.5	38.76	17.63	27.6	44.69	27.98
28.5	8.13	52.16	28.5	14.86	54.33	28.5	57.15	62.05	28.5	39.31	17.88	28.6	44.79	28.30
29.5	8.03	52.53	29.5	14.90	54.59	29.5	57.13	62.41	29.5	39.90	18.13	29.6	44.87	28.63
30.5	7.90	52.89	30.5	14.97	54.85	30.5	57.05	62.78	30.5	40.54	18.37	30.6	44.95	29.00
31.5	7.74	53.24	31.5	15.07	55.11	31.5	56.88	63.17	31.5	41.26	18.60	31.6	45.03	29.38
32.5	7.56	53.58	32.5	15.18	55.38	32.5	56.60	63.53	32.5	42.04	18.85	32.6	45.09	29.76
16.93	+16.90		24.53	-24.51		58.23	+58.23		73.52	-73.52		7.39	+7.32	
17 <sup>h</sup> 59 <sup>m</sup>	1 <sup>s</sup> .307		18 <sup>h</sup> 6 <sup>m</sup>	11 <sup>s</sup> .893		19 <sup>h</sup> 2 <sup>m</sup>	39 <sup>s</sup> .624		19 <sup>h</sup> 27 <sup>m</sup>	42 <sup>s</sup> .218		20 <sup>h</sup> 48 <sup>m</sup>	40 <sup>s</sup> .494	
+86° 36'	51'' .17		-87° 39'	51'' .82		+89° 1'	2'' .17		-89° 13'	28'' .57		+82° 13'	29'' .86	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			$\delta$ H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "	June	h m	° ' "
	21 38	-83 5		22 16	-86 22		22 37	-81 48		23 27	+86 50		23 47	-82 28
	s	"		s	"		s	"		s	"		s	"
1.7	30.73	37.15	1.7	22.45	54.78	1.7	44.91	29.49	1.8	38.05	53.04	1.8	17.39	14.66
2.7	30.90	37.12	2.7	22.77	54.72	2.7	45.05	29.39	2.8	38.49	53.06	2.8	17.53	14.50
3.7	31.08	37.09	3.7	23.09	54.64	3.7	45.20	29.28	3.8	38.94	53.10	3.8	17.67	14.30
4.7	31.27	37.06	4.7	23.45	54.57	4.7	45.36	29.16	4.8	39.37	53.16	4.8	17.82	14.10
5.7	31.49	37.04	5.7	23.81	54.50	5.7	45.53	29.05	5.8	39.75	53.24	5.8	17.99	13.89
6.7	31.70	37.03	6.7	24.22	54.43	6.7	45.71	28.95	6.8	40.14	53.31	6.8	18.16	13.70
7.7	31.92	37.05	7.7	24.62	54.40	7.7	45.89	28.89	7.8	40.51	53.38	7.8	18.34	13.52
8.7	32.13	37.09	8.7	25.03	54.40	8.7	46.08	28.83	8.8	40.84	53.44	8.8	18.53	13.36
9.7	32.35	37.17	9.7	25.42	54.40	9.7	46.26	28.80	9.8	41.19	53.49	9.8	18.73	13.22
10.7	32.54	37.25	10.7	25.80	54.45	10.7	46.44	28.79	10.8	41.54	53.53	10.8	18.90	13.11
11.7	32.71	37.34	11.7	26.14	54.49	11.7	46.59	28.79	11.8	41.91	53.56	11.8	19.07	13.03
12.7	32.87	37.42	12.7	26.46	54.52	12.7	46.72	28.79	12.8	42.31	53.59	12.8	19.22	12.95
13.7	33.04	37.48	13.7	26.76	54.55	13.7	46.87	28.79	13.7	42.74	53.64	13.8	19.36	12.87
14.7	33.18	37.54	14.7	27.04	54.58	14.7	47.00	28.78	14.7	43.19	53.71	14.8	19.50	12.78
15.7	33.34	37.59	15.7	27.35	54.59	15.7	47.14	28.74	15.7	43.64	53.81	15.8	19.64	12.66
16.7	33.51	37.62	16.7	27.65	54.60	16.7	47.29	28.70	16.7	44.07	53.93	16.8	19.79	12.54
17.7	33.68	37.66	17.7	27.98	54.60	17.7	47.46	28.67	17.7	44.49	54.06	17.8	19.95	12.42
18.7	33.87	37.71	18.7	28.35	54.59	18.7	47.62	28.63	18.7	44.88	54.21	18.8	20.13	12.29
19.7	34.07	37.79	19.7	28.72	54.62	19.7	47.79	28.62	19.7	45.26	54.35	19.7	20.31	12.18
20.7	34.26	37.88	20.7	29.09	54.66	20.7	47.97	28.62	20.7	45.61	54.49	20.7	20.48	12.08
21.7	34.46	37.98	21.7	29.46	54.73	21.7	48.15	28.64	21.7	45.95	54.61	21.7	20.67	12.01
22.7	34.64	38.10	22.7	29.83	54.81	22.7	48.31	28.67	22.7	46.28	54.74	22.7	20.86	11.96
23.6	34.82	38.25	23.7	30.17	54.91	23.7	48.48	28.73	23.7	46.62	54.84	23.7	21.04	11.91
24.6	34.98	38.40	24.7	30.50	55.03	24.7	48.63	28.81	24.7	46.98	54.94	24.7	21.21	11.88
25.6	35.13	38.55	25.7	30.82	55.15	25.7	48.77	28.88	25.7	47.34	55.07	25.7	21.38	11.86
26.6	35.27	38.70	26.7	31.11	55.28	26.7	48.91	28.96	26.7	47.72	55.18	26.7	21.54	11.85
27.6	35.42	38.85	27.7	31.39	55.37	27.7	49.04	29.03	27.7	48.12	55.30	27.7	21.68	11.84
28.6	35.55	38.99	28.7	31.66	55.48	28.7	49.17	29.09	28.7	48.52	55.44	28.7	21.83	11.83
29.6	35.68	39.12	29.7	31.93	55.58	29.7	49.30	29.14	29.7	48.94	55.61	29.7	21.98	11.81
30.6	35.82	39.22	30.7	32.21	55.67	30.7	49.43	29.19	30.7	49.35	55.79	30.7	22.13	11.78
31.6	35.98	39.32	31.7	32.50	55.73	31.7	49.57	29.24	31.7	49.76	56.01	31.7	22.28	11.73
32.6	36.15	39.44	32.6	32.82	55.79	32.7	49.73	29.27	32.7	50.13	56.23	32.7	22.45	11.67
8.32	-8.26		15.85	-15.81		7.02	-6.95		18.19	+18.16		7.63	-7.56	
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
July	h m	° ' "	July	h m	° ' "	July	h m	° ' "	July	h m	° ' "	July	h m	° ' "
	0 57	+85 48		1 30	+88 51		1 41	-85 10		4 10	+85 20		5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.8	12.63	41.64	0.8	16.61	39.69	0.8	55.31	46.26	0.9	3.23	7.34	0.9	12.73	28.21
1.8	12.97	41.73	1.8	17.89	39.69	1.8	55.50	46.08	1.9	3.49	7.12	1.9	12.91	27.91
2.8	13.31	41.83	2.8	19.14	39.74	2.8	55.71	45.91	2.9	3.76	6.92	2.9	13.09	27.62
3.8	13.64	41.94	3.8	20.32	39.80	3.8	55.93	45.71	3.9	4.02	6.76	3.9	13.28	27.38
4.8	13.94	42.07	4.8	21.43	39.87	4.8	56.17	45.51	4.9	4.27	6.61	4.9	13.47	27.14
5.8	14.23	42.18	5.8	22.48	39.93	5.8	56.43	45.34	5.9	4.51	6.47	5.9	13.64	26.91
6.7	14.51	42.28	6.8	23.48	39.98	6.8	56.70	45.19	6.9	4.74	6.34	6.9	13.79	26.68
7.7	14.78	42.37	7.8	24.47	40.02	7.8	56.97	45.07	7.9	4.94	6.19	7.9	13.94	26.45
8.7	15.05	42.43	8.8	25.49	40.04	8.8	57.22	44.98	8.9	5.15	6.01	8.9	14.08	26.21
9.7	15.33	42.49	9.8	26.58	40.04	9.8	57.47	44.91	9.9	5.37	5.82	9.9	14.21	25.94
10.7	15.66	42.55	10.8	27.73	40.04	10.8	57.69	44.85	10.9	5.59	5.60	10.9	14.34	25.66
11.7	15.99	42.63	11.8	28.98	40.06	11.8	57.91	44.79	11.9	5.84	5.38	11.9	14.50	25.34
12.7	16.34	42.73	12.8	30.26	40.11	12.8	58.11	44.73	12.9	6.11	5.18	12.9	14.68	25.04
13.7	16.69	42.86	13.8	31.56	40.16	13.8	58.32	44.64	13.9	6.39	4.99	13.9	14.88	24.75
14.7	17.04	43.00	14.8	32.85	40.26	14.8	58.54	44.54	14.9	6.69	4.84	14.9	15.11	24.46
15.7	17.37	43.16	15.7	34.08	40.36	15.8	58.76	44.44	15.9	6.99	4.70	15.9	15.33	24.20
16.7	17.69	43.33	16.7	35.24	40.48	16.8	59.00	44.33	16.9	7.27	4.58	16.9	15.55	23.96
17.7	17.97	43.50	17.7	36.34	40.61	17.8	59.27	44.21	17.9	7.56	4.47	17.9	15.77	23.75
18.7	18.25	43.66	18.7	37.39	40.72	18.7	59.53	44.11	18.9	7.83	4.38	18.9	15.97	23.56
19.7	18.51	43.82	19.7	38.41	40.82	19.7	59.79	44.06	19.8	8.07	4.28	19.9	16.17	23.37
20.7	18.78	43.97	20.7	39.41	40.93	20.7	60.07	44.01	20.8	8.32	4.18	20.9	16.37	23.17
21.7	19.04	44.11	21.7	40.43	41.02	21.7	60.34	43.99	21.8	8.56	4.07	21.9	16.55	22.95
22.7	19.31	44.25	22.7	41.45	41.11	22.7	60.61	43.99	22.8	8.81	3.95	22.9	16.72	22.73
23.7	19.59	44.38	23.7	42.51	41.20	23.7	60.85	43.98	23.8	9.05	3.81	23.9	16.90	22.50
24.7	19.88	44.53	24.7	43.64	41.29	24.7	61.09	44.02	24.8	9.31	3.67	24.9	17.09	22.26
25.7	20.19	44.68	25.7	44.80	41.38	25.7	61.32	44.04	25.8	9.58	3.53	25.9	17.28	22.02
26.7	20.50	44.83	26.7	46.01	41.49	26.7	61.55	44.04	26.8	9.87	3.39	26.9	17.51	21.77
27.7	20.83	45.01	27.7	47.25	41.62	27.7	61.75	44.04	27.8	10.17	3.25	27.9	17.75	21.52
28.7	21.16	45.23	28.7	48.49	41.76	28.7	61.97	44.03	28.8	10.49	3.15	28.9	18.00	21.28
29.7	21.47	45.46	29.7	49.71	41.95	29.7	62.20	44.01	29.8	10.83	3.07	29.9	18.27	21.07
30.7	21.76	45.70	30.7	50.89	42.14	30.7	62.43	43.99	30.8	11.16	3.01	30.9	18.55	20.87
31.7	22.05	45.97	31.7	51.98	42.35	31.7	62.68	43.97	31.8	11.49	2.96	31.9	18.83	20.71
13.69	+13.66		50.32	+50.31		11.90	-11.86		12.29	+12.25		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "		h m s	° ' "
July	5 45	-84 49	July	6 46	-80 43	July	7 2	+87 10	July	7 13	+82 34	July	7 15	-86 54
0.9	50.29	40.27	1.0	45.87	41.22	1.0	1.39	53.96	1.0	42.82	29.60	1.0	38.06	14.65
1.9	50.28	39.96	2.0	45.85	40.95	2.0	1.50	53.59	2.0	42.86	29.25	2.0	37.92	14.39
2.9	50.28	39.65	3.0	45.82	40.64	3.0	1.63	53.24	3.0	42.91	28.92	3.0	37.76	14.12
3.9	50.27	39.34	3.9	45.79	40.33	4.0	1.78	52.92	4.0	42.97	28.62	4.0	37.59	13.81
4.9	50.27	39.00	4.9	45.77	40.00	5.0	1.94	52.62	5.0	43.03	28.32	5.0	37.43	13.50
5.9	50.30	38.63	5.9	45.75	39.65	6.0	2.09	52.34	6.0	43.08	28.03	6.0	37.29	13.18
6.9	50.34	38.27	6.9	45.74	39.29	7.0	2.21	52.06	7.0	43.13	27.76	7.0	37.18	12.84
7.9	50.39	37.93	7.9	45.73	38.93	7.9	2.31	51.78	8.0	43.17	27.49	8.0	37.10	12.49
8.9	50.45	37.59	8.9	45.74	38.59	8.9	2.38	51.48	9.0	43.18	27.22	9.0	37.05	12.17
9.9	50.52	37.27	9.9	45.75	38.27	9.9	2.44	51.17	10.0	43.20	26.92	10.0	37.02	11.85
10.9	50.59	36.99	10.9	45.76	37.98	10.9	2.52	50.82	10.9	43.23	26.57	10.9	37.01	11.56
11.9	50.66	36.74	11.9	45.77	37.69	11.9	2.61	50.46	11.9	43.26	26.21	11.9	36.99	11.29
12.9	50.72	36.49	12.9	45.78	37.42	12.9	2.73	50.10	12.9	43.30	25.86	12.9	36.96	11.03
13.9	50.78	36.22	13.9	45.79	37.14	13.9	2.90	49.73	13.9	43.36	25.51	13.9	36.93	10.76
14.9	50.82	35.95	14.9	45.79	36.86	14.9	3.09	49.37	14.9	43.44	25.16	14.9	36.87	10.50
15.9	50.87	35.66	15.9	45.80	36.56	15.9	3.32	49.03	15.9	43.52	24.82	15.9	36.80	10.21
16.9	50.93	35.35	16.9	45.81	36.25	16.9	3.54	48.72	16.9	43.61	24.51	16.9	36.74	9.90
17.9	50.99	35.04	17.9	45.82	35.92	17.9	3.77	48.43	17.9	43.70	24.22	17.9	36.69	9.58
18.9	51.08	34.71	18.9	45.83	35.58	18.9	3.99	48.14	18.9	43.78	23.94	18.9	36.65	9.26
19.9	51.17	34.39	19.9	45.85	35.21	19.9	4.19	47.87	19.9	43.85	23.66	19.9	36.65	8.92
20.9	51.27	34.06	20.9	45.88	34.86	20.9	4.38	47.59	20.9	43.91	23.38	20.9	36.65	8.57
21.9	51.40	33.75	21.9	45.91	34.52	21.9	4.56	47.31	21.9	43.98	23.11	21.9	36.69	8.24
22.9	51.52	33.46	22.9	45.95	34.19	22.9	4.73	47.01	22.9	44.04	22.83	22.9	36.74	7.91
23.9	51.64	33.19	23.9	45.99	33.88	23.9	4.90	46.71	23.9	44.10	22.54	23.9	36.81	7.60
24.9	51.77	32.94	24.9	46.03	33.59	24.9	5.07	46.39	24.9	44.16	22.23	24.9	36.89	7.30
25.9	51.90	32.70	25.9	46.08	33.30	25.9	5.25	46.06	25.9	44.23	21.90	25.9	36.97	7.02
26.9	52.01	32.48	26.9	46.13	33.04	26.9	5.47	45.74	26.9	44.31	21.57	26.9	37.05	6.75
27.9	52.12	32.25	27.9	46.17	32.78	27.9	5.71	45.40	27.9	44.39	21.23	27.9	37.12	6.50
28.9	52.23	32.01	28.9	46.21	32.51	28.9	5.98	45.06	28.9	44.50	20.90	28.9	37.17	6.24
29.9	52.34	31.76	29.9	46.25	32.23	29.9	6.29	44.74	29.9	44.62	20.58	29.9	37.21	5.97
30.9	52.44	31.50	30.9	46.28	31.94	30.9	6.63	44.43	30.9	44.75	20.28	30.9	37.25	5.69
31.9	52.55	31.22	31.9	46.32	31.63	31.9	6.99	44.14	31.9	44.88	19.99	31.9	37.27	5.39
11.09	-11.04		6.20	-6.12		20.33	+20.30		7.74	+7.67		18.51	-18.48	
5 <sup>h</sup> 46 <sup>m</sup>	14°.756		6 <sup>h</sup> 46 <sup>m</sup>	58°.546		7 <sup>h</sup> 2 <sup>m</sup>	4°.048		7 <sup>h</sup> 13 <sup>m</sup>	42°.294		7 <sup>h</sup> 16 <sup>m</sup>	20°.292	
-84° 49'	46''.89		-80° 43'	38''.16		+87° 10'	54''.74		+82° 34'	30''.13		-86° 54'	6''.70	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m	° '	July	h m	° '	July	h m	° '	July	h m	° '	July	h m	° '
	8 15	+88 52		9 8	-85 20		9 25	+81 41		9 36	-80 34		10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
1.1	37.65	60.72	1.1	37.32	21.48	1.1	22.59	43.09	1.1	14.74	33.83	1.2	5.64	56.45
2.1	37.49	60.36	2.1	37.15	21.32	2.1	22.52	42.77	2.1	14.64	33.68	2.2	5.54	56.18
3.1	37.42	60.02	3.1	36.97	21.16	3.1	22.47	42.44	3.1	14.55	33.54	3.2	5.44	55.91
4.1	37.41	59.67	4.1	36.77	20.97	4.1	22.44	42.15	4.1	14.46	33.37	4.1	5.36	55.64
5.1	37.42	59.35	5.1	36.57	20.74	5.1	22.41	41.85	5.1	14.36	33.18	5.1	5.28	55.38
6.1	37.44	59.03	6.1	36.36	20.50	6.1	22.39	41.56	6.1	14.26	32.97	6.1	5.20	55.15
7.1	37.41	58.75	7.1	36.17	20.23	7.1	22.34	41.30	7.1	14.16	32.74	7.1	5.12	54.91
8.1	37.30	58.47	8.1	35.99	19.96	8.1	22.30	41.06	8.1	14.06	32.49	8.1	5.03	54.71
9.0	37.14	58.16	9.1	35.84	19.70	9.1	22.24	40.82	9.1	13.97	32.23	9.1	4.93	54.48
10.0	36.94	57.83	10.1	35.71	19.44	10.1	22.17	40.55	10.1	13.90	31.98	10.1	4.82	54.26
11.0	36.73	57.49	11.1	35.60	19.18	11.1	22.11	40.27	11.1	13.84	31.74	11.1	4.69	54.00
12.0	36.55	57.12	12.1	35.50	18.95	12.1	22.03	39.96	12.1	13.78	31.51	12.1	4.58	53.73
13.0	36.44	56.74	13.1	35.38	18.75	13.1	21.98	39.62	13.1	13.72	31.31	13.1	4.47	53.44
14.0	36.43	56.36	14.1	35.25	18.55	14.1	21.93	39.26	14.1	13.66	31.12	14.1	4.36	53.12
15.0	36.49	55.96	15.1	35.13	18.33	15.1	21.90	38.90	15.1	13.59	30.93	15.1	4.27	52.80
16.0	36.63	55.60	16.1	34.99	18.09	16.1	21.88	38.56	16.1	13.51	30.71	16.1	4.21	52.48
17.0	36.81	55.27	17.1	34.84	17.85	17.1	21.87	38.25	17.1	13.43	30.47	17.1	4.15	52.17
18.0	37.00	54.93	18.1	34.70	17.58	18.1	21.86	37.92	18.1	13.36	30.21	18.1	4.09	51.88
19.0	37.20	54.59	19.1	34.56	17.31	19.1	21.85	37.61	19.1	13.28	29.94	19.1	4.03	51.59
20.0	37.37	54.28	20.1	34.43	17.01	20.1	21.84	37.33	20.1	13.21	29.65	20.1	3.98	51.31
21.0	37.51	53.98	21.1	34.30	16.71	21.1	21.81	37.05	21.1	13.14	29.35	21.1	3.90	51.05
22.0	37.60	53.68	22.0	34.20	16.39	22.1	21.78	36.76	22.1	13.08	29.06	22.1	3.83	50.77
23.0	37.67	53.36	23.0	34.11	16.09	23.1	21.75	36.46	23.1	13.02	28.77	23.1	3.75	50.50
24.0	37.73	53.04	24.0	34.03	15.80	24.1	21.72	36.16	24.1	12.97	28.47	24.1	3.67	50.23
25.0	37.79	52.69	25.0	33.98	15.50	25.1	21.68	35.84	25.1	12.93	28.18	25.1	3.59	49.94
26.0	37.87	52.32	26.0	33.92	15.22	26.1	21.65	35.49	26.1	12.89	27.91	26.1	3.50	49.62
26.9	38.01	51.96	27.0	33.87	14.96	27.0	21.62	35.14	27.1	12.86	27.65	27.1	3.41	49.30
27.9	38.20	51.58	28.0	33.81	14.70	28.0	21.61	34.78	28.1	12.82	27.41	28.1	3.34	48.96
28.9	38.49	51.19	29.0	33.75	14.46	29.0	21.60	34.41	29.0	12.78	27.18	29.1	3.29	48.61
29.9	38.87	50.81	30.0	33.67	14.20	30.0	21.61	34.03	30.0	12.74	26.95	30.1	3.24	48.24
30.9	39.33	50.43	31.0	33.59	13.93	31.0	21.65	33.66	31.0	12.70	26.70	31.1	3.21	47.86
31.9	39.83	50.08	32.0	33.50	13.66	32.0	21.67	33.31	32.0	12.65	26.43	32.1	3.20	47.51
51.26	+51.25		12.30	-12.26		6.92	+6.85		6.11	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".07		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

7 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			1 Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m    ° ' "		July	h m    ° ' "		July	h m    ° ' "		July	h m    ° ' "		July	h m    ° ' "	
	10 59   -84 9			12 14   +88 9			12 46   -84 40			12 48   +83 51			13 27   -85 22	
	s        "        "			s        "        "			s        "        "			s        "        "			s        "        "	
1.2	48.84   24.93		1.2	27.53   39.67		1.3	12.01   59.23		1.3	32.30   54.24		1.3	25.17   17.98	
2.2	48.68   24.89		2.2	26.83   39.53		2.3	11.83   59.31		2.3	32.09   54.16		2.3	24.99   18.13	
3.2	48.51   24.85		3.2	26.17   39.37		3.3	11.65   59.40		3.3	31.89   54.07		3.3	24.80   18.29	
4.2	48.31   24.80		4.2	25.57   39.21		4.2	11.46   59.50		4.2	31.70   53.97		4.3	24.58   18.45	
5.2	48.11   24.75		5.2	25.01   39.07		5.2	11.24   59.58		5.2	31.53   53.86		5.3	24.35   18.59	
6.2	47.91   24.66		6.2	24.47   38.92		6.2	11.00   59.65		6.2	31.37   53.76		6.3	24.09   18.71	
7.2	47.70   24.52		7.2	23.93   38.80		7.2	10.77   59.68		7.2	31.20   53.68		7.3	23.83   18.81	
8.2	47.50   24.38		8.2	23.38   38.67		8.2	10.52   59.69		8.2	31.03   53.62		8.3	23.56   18.88	
9.2	47.32   24.23		9.2	22.78   38.57		9.2	10.30   59.68		9.2	30.85   53.57		9.3	23.31   18.92	
10.2	47.14   24.07		10.2	22.13   38.46		10.2	10.09   59.65		10.2	30.65   53.52		10.3	23.06   18.94	
11.2	47.00   23.92		11.2	21.43   38.34		11.2	9.90   59.62		11.2	30.43   53.46		11.3	22.84   18.97	
12.2	46.85   23.78		12.2	20.74   38.20		12.2	9.71   59.60		12.2	30.21   53.38		12.3	22.64   18.99	
13.1	46.71   23.68		13.2	20.02   38.03		13.2	9.55   59.59		13.2	29.99   53.28		13.3	22.45   19.03	
14.1	46.58   23.57		14.2	19.34   37.84		14.2	9.38   59.60		14.2	29.79   53.14		14.2	22.26   19.09	
15.1	46.43   23.44		15.2	18.68   37.64		15.2	9.20   59.61		15.2	29.59   53.00		15.2	22.06   19.15	
16.1	46.26   23.32		16.2	18.08   37.43		16.2	9.00   59.61		16.2	29.40   52.85		16.2	21.84   19.21	
17.1	46.09   23.19		17.2	17.52   37.21		17.2	8.79   59.62		17.2	29.22   52.69		17.2	21.61   19.28	
18.1	45.91   23.05		18.2	17.00   37.00		18.2	8.57   59.62		18.2	29.05   52.53		18.2	21.36   19.33	
19.1	45.73   22.87		19.2	16.48   36.80		19.2	8.35   59.60		19.2	28.88   52.37		19.2	21.09   19.37	
20.1	45.56   22.68		20.2	15.97   36.61		20.2	8.12   59.55		20.2	28.73   52.22		20.2	20.82   19.39	
21.1	45.39   22.48		21.2	15.46   36.43		21.2	7.88   59.49		21.2	28.56   52.09		21.2	20.56   19.38	
22.1	45.22   22.25		22.2	14.94   36.25		22.2	7.66   59.41		22.2	28.39   51.96		22.2	20.29   19.35	
23.1	45.07   22.03		23.2	14.38   36.07		23.2	7.44   59.32		23.2	28.21   51.84		23.2	20.03   19.31	
24.1	44.93   21.81		24.2	13.81   35.89		24.2	7.24   59.22		24.2	28.03   51.70		24.2	19.78   19.26	
25.1	44.80   21.59		25.2	13.21   35.70		25.2	7.04   59.09		25.2	27.84   51.58		25.2	19.54   19.21	
26.1	44.67   21.37		26.2	12.60   35.51		26.2	6.86   58.98		26.2	27.64   51.44		26.2	19.32   19.15	
27.1	44.56   21.16		27.2	11.97   35.27		27.2	6.68   58.90		27.2	27.44   51.27		27.2	19.12   19.10	
28.1	44.45   20.98		28.2	11.35   35.02		28.2	6.52   58.82		28.2	27.24   51.08		28.2	18.92   19.07	
29.1	44.33   20.81		29.2	10.75   34.76		29.2	6.35   58.75		29.2	27.05   50.87		29.2	18.72   19.05	
30.1	44.21   20.63		30.2	10.19   34.48		30.2	6.18   58.69		30.2	26.86   50.64		30.2	18.51   19.04	
31.1	44.09   20.46		31.2	9.70   34.18		31.2	5.99   58.63		31.2	26.71   50.41		31.2	18.29   19.04	
32.1	43.94   20.27		32.1	9.23   33.87		32.2	5.80   58.57		32.2	26.55   50.16		32.2	18.06   19.03	
9.82	-9.77		31.15	+31.14		10.79	-10.75		9.36	+9.30		12.39	-12.35	
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418		13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624			
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47		-85° 21' 42".23			



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
July	14 13	-83 17	July	15 3	+87 33	July	15 24	-84 11	July	16 54	+82 10	July	17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
1.3	39.86	53.99	1.4	45.51	14.32	1.4	16.31	56.77	1.4	29.47	35.67	1.4	12.15	17.59
2.3	39.75	54.17	2.3	44.98	14.44	2.4	16.23	57.01	2.4	29.37	35.95	2.4	12.16	17.87
3.3	39.65	54.36	3.3	44.45	14.54	3.4	16.15	57.27	3.4	29.25	36.21	3.4	12.17	18.15
4.3	39.51	54.56	4.3	43.94	14.62	4.4	16.07	57.53	4.4	29.15	36.45	4.4	12.18	18.44
5.3	39.39	54.76	5.3	43.47	14.68	5.4	15.95	57.80	5.4	29.04	36.68	5.4	12.18	18.76
6.3	39.22	54.95	6.3	43.01	14.75	6.4	15.82	58.07	6.4	28.94	36.89	6.4	12.18	19.08
7.3	39.06	55.10	7.3	42.59	14.84	7.3	15.68	58.30	7.4	28.84	37.11	7.4	12.14	19.40
8.3	38.89	55.23	8.3	42.15	14.96	8.3	15.52	58.53	8.4	28.75	37.35	8.4	12.10	19.68
9.3	38.73	55.34	9.3	41.70	15.08	9.3	15.35	58.71	9.4	28.66	37.58	9.4	12.06	19.95
10.3	38.58	55.42	10.3	41.23	15.22	10.3	15.20	58.87	10.4	28.56	37.86	10.4	12.00	20.19
11.3	38.44	55.48	11.3	40.71	15.35	11.3	15.06	59.01	11.4	28.44	38.15	11.4	11.96	20.42
12.3	38.30	55.56	12.3	40.16	15.49	12.3	14.93	59.16	12.4	28.32	38.44	12.4	11.93	20.63
13.3	38.17	55.62	13.3	39.60	15.60	13.3	14.81	59.31	13.4	28.19	38.73	13.4	11.90	20.85
14.3	38.05	55.72	14.3	39.02	15.69	14.3	14.71	59.48	14.4	28.06	39.00	14.4	11.87	21.06
15.3	37.94	55.83	15.3	38.45	15.75	15.3	14.60	59.66	15.4	27.93	39.23	15.4	11.85	21.31
16.3	37.81	55.95	16.3	37.88	15.81	16.3	14.48	59.85	16.4	27.80	39.44	16.4	11.83	21.58
17.3	37.67	56.05	17.3	37.35	15.84	17.3	14.34	60.04	17.4	27.66	39.63	17.4	11.80	21.85
18.3	37.49	56.17	18.3	36.84	15.87	18.3	14.19	60.23	18.4	27.54	39.82	18.4	11.77	22.13
19.3	37.33	56.28	19.3	36.34	15.89	19.3	14.02	60.41	19.4	27.41	40.00	19.4	11.72	22.40
20.3	37.16	56.36	20.3	35.87	15.91	20.3	13.85	60.60	20.4	27.29	40.18	20.4	11.66	22.67
21.3	36.97	56.42	21.3	35.39	15.94	21.3	13.67	60.75	21.4	27.17	40.36	21.4	11.60	22.94
22.3	36.80	56.46	22.3	34.90	15.98	22.3	13.48	60.89	22.4	27.04	40.56	22.4	11.52	23.18
23.3	36.62	56.52	23.3	34.40	16.04	23.3	13.29	61.02	23.4	26.93	40.78	23.4	11.44	23.42
24.3	36.44	56.50	24.3	33.89	16.10	24.3	13.10	61.13	24.4	26.80	41.00	24.4	11.36	23.62
25.3	36.29	56.50	25.3	33.36	16.16	25.3	12.92	61.22	25.4	26.66	41.21	25.4	11.28	23.81
26.2	36.14	56.49	26.3	32.80	16.21	26.3	12.76	61.30	26.4	26.53	41.44	26.4	11.22	23.99
27.2	35.99	56.49	27.3	32.21	16.26	27.3	12.61	61.37	27.4	26.38	41.67	27.4	11.16	24.16
28.2	35.85	56.51	28.3	31.61	16.28	28.3	12.47	61.46	28.4	26.22	41.87	28.4	11.10	24.35
29.2	35.72	56.54	29.3	31.01	16.28	29.3	12.33	61.55	29.4	26.05	42.07	29.4	11.04	24.54
30.2	35.59	56.57	30.3	30.40	16.25	30.3	12.18	61.67	30.3	25.89	42.25	30.4	11.00	24.75
31.2	35.45	56.61	31.3	29.83	16.20	31.3	12.04	61.80	31.3	25.72	42.40	31.4	10.95	24.97
32.2	35.28	56.67	32.3	29.26	16.12	32.3	11.88	61.94	32.3	25.58	42.50	32.4	10.90	25.20
8.57	-8.51		23.43	+23.41		9.89	-9.84		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21".03			+87° 33' 10".52			-84° 11' 30".39			+82° 10' 32".75			-80° 47' 6".56		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursæ Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursæ Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m	° ' "	July	h m	° ' "	July	h m	° ' "	July	h m	° ' "	July	h m	° ' "
	17 59	+86 36		18 7	-87 39		19 2	+89 1		19 30	-89 13		20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
1.5	7.74	53.24	1.5	15.07	55.11	1.5	56.88	3.17	1.5	41.26	18.60	1.6	45.03	29.38
2.5	7.56	53.58	2.5	15.18	55.38	2.5	56.60	3.53	2.5	42.04	18.85	2.6	45.09	29.76
3.5	7.38	53.89	3.5	15.29	55.68	3.5	56.25	3.87	3.5	42.88	19.11	3.6	45.14	30.13
4.5	7.18	54.19	4.5	15.41	55.99	4.5	55.86	4.20	4.5	43.71	19.41	4.6	45.19	30.47
5.5	6.99	54.46	5.5	15.48	56.33	5.5	55.48	4.50	5.5	44.49	19.72	5.6	45.23	30.80
6.5	6.81	54.72	6.5	15.51	56.68	6.5	55.16	4.78	6.5	45.15	20.04	6.6	45.27	31.11
7.5	6.66	54.99	7.5	15.48	57.02	7.5	54.90	5.08	7.5	45.67	20.36	7.6	45.30	31.41
8.5	6.51	55.26	8.5	15.43	57.36	8.5	54.68	5.38	8.5	46.07	20.68	8.6	45.35	31.70
9.5	6.37	55.55	9.5	15.34	57.66	9.5	54.50	5.70	9.5	46.34	20.96	9.6	45.40	32.02
10.4	6.23	55.86	10.5	15.24	57.95	10.5	54.34	6.04	10.5	46.54	21.24	10.6	45.47	32.36
11.4	6.06	56.19	11.5	15.14	58.20	11.5	54.12	6.41	11.5	46.73	21.51	11.6	45.52	32.73
12.4	5.87	56.55	12.4	15.07	58.44	12.5	53.84	6.79	12.5	46.96	21.75	12.6	45.58	33.11
13.4	5.66	56.89	13.4	15.03	58.69	13.5	53.47	7.17	13.5	47.26	22.00	13.6	45.63	33.51
14.4	5.43	57.22	14.4	14.99	58.94	14.5	53.01	7.54	14.5	47.61	22.24	14.6	45.67	33.90
15.4	5.18	57.52	15.4	14.98	59.21	15.5	52.48	7.89	15.5	48.02	22.52	15.6	45.70	34.30
16.4	4.93	57.81	16.4	14.95	59.50	16.5	51.89	8.23	16.5	48.44	22.80	16.5	45.71	34.68
17.4	4.68	58.08	17.4	14.90	59.81	17.5	51.29	8.54	17.5	48.83	23.11	17.5	45.73	35.05
18.4	4.43	58.32	18.4	14.83	60.13	18.5	50.72	8.83	18.5	49.15	23.42	18.5	45.75	35.39
19.4	4.19	58.56	19.4	14.72	60.45	19.5	50.15	9.12	19.5	49.39	23.74	19.5	45.76	35.73
20.4	3.96	58.79	20.4	14.58	60.77	20.5	49.63	9.41	20.5	49.53	24.07	20.5	45.77	36.06
21.4	3.74	59.04	21.4	14.40	61.08	21.5	49.14	9.69	21.5	49.57	24.41	21.5	45.77	36.39
22.4	3.52	59.29	22.4	14.20	61.37	22.5	48.66	9.99	22.5	49.51	24.73	22.5	45.79	36.71
23.4	3.30	59.56	23.4	13.97	61.66	23.5	48.20	10.29	23.5	49.39	25.06	23.5	45.80	37.04
24.4	3.08	59.84	24.4	13.73	61.91	24.5	47.73	10.61	24.5	49.22	25.35	24.5	45.83	37.39
25.4	2.85	60.12	25.4	13.51	62.16	25.5	47.23	10.93	25.5	49.01	25.64	25.5	45.86	37.76
26.4	2.59	60.42	26.4	13.30	62.39	26.4	46.69	11.27	26.5	48.81	25.91	26.5	45.87	38.14
27.4	2.32	60.71	27.4	13.10	62.62	27.4	46.07	11.62	27.5	48.65	26.18	27.5	45.88	38.52
28.4	2.03	61.01	28.4	12.92	62.84	28.4	45.36	11.97	28.5	48.57	26.42	28.5	45.89	38.94
29.4	1.71	61.28	29.4	12.78	63.08	29.4	44.56	12.30	29.5	48.54	26.68	29.5	45.89	39.35
30.4	1.38	61.53	30.4	12.65	63.32	30.4	43.69	12.63	30.5	48.58	26.96	30.5	45.88	39.76
31.4	1.04	61.76	31.4	12.51	63.60	31.4	42.76	12.92	31.5	48.65	27.25	31.5	45.84	40.14
32.4	0.70	61.97	32.4	12.34	63.88	32.4	41.82	13.21	32.5	48.67	27.56	32.5	45.82	40.51
16.94	+16.91		24.56	-24.54		58.40	+58.39		73.73	-73.73		7.39	+7.33	
17 <sup>h</sup> 59 <sup>m</sup>	1° 307		18 <sup>h</sup> 6 <sup>m</sup>	11° 893		19 <sup>h</sup> 2 <sup>m</sup>	39° 624		19 <sup>h</sup> 27 <sup>m</sup>	42° 218		20 <sup>h</sup> 48 <sup>m</sup>	40° 494	
+86° 36'	51' 17"		-87° 39'	51' 82"		+89° 1'	2' 17"		-89° 13'	28' 57"		+82° 13'	29' 86"	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
July	h m    ° ' "		July	h m    ° ' "		July	h m    ° ' "		July	h m    ° ' "		July	h m    ° ' "	
	21 38    -83 5			22 16    -86 22			22 37    -81 48			23 27    +86 50			23 47    -82 28	
	s        "        "			s        "        "			s        "        "			s        "        "			s        "        "	
1.6	35.98   39.32	1.7	32.50   55.73	1.7	49.57   29.24	1.7	49.76   56.01	1.7	22.28   11.73					
2.6	36.15   39.44	2.6	32.82   55.79	2.7	49.73   29.27	2.7	50.13   56.23	2.7	22.45   11.67					
3.6	36.32   39.56	3.6	33.14   55.88	3.7	49.88   29.30	3.7	50.46   56.45	3.7	22.62   11.64					
4.6	36.49   39.70	4.6	33.49   55.97	4.7	50.05   29.35	4.7	50.80   56.68	4.7	22.81   11.60					
5.6	36.67   39.86	5.6	33.86   56.10	5.7	50.23   29.43	5.7	51.11   56.90	5.7	23.00   11.58					
6.6	36.84   40.04	6.6	34.19   56.23	6.7	50.39   29.51	6.7	51.39   57.11	6.7	23.20   11.58					
7.6	36.98   40.25	7.6	34.52   56.40	7.6	50.54   29.65	7.7	51.68   57.29	7.7	23.38   11.61					
8.6	37.13   40.47	8.6	34.80   56.58	8.6	50.68   29.80	8.7	52.00   57.47	8.7	23.55   11.66					
9.6	37.25   40.70	9.6	35.08   56.76	9.6	50.80   29.96	9.7	52.33   57.64	9.7	23.69   11.73					
10.6	37.36   40.89	10.6	35.31   56.94	10.6	50.92   30.11	10.7	52.69   57.82	10.7	23.84   11.79					
11.6	37.45   41.09	11.6	35.53   57.09	11.6	51.03   30.25	11.7	53.06   58.04	11.7	23.98   11.86					
12.6	37.56   41.27	12.6	35.75   57.24	12.6	51.13   30.38	12.7	53.45   58.26	12.7	24.11   11.91					
13.6	37.68   41.44	13.6	35.98   57.39	13.6	51.25   30.50	13.7	53.83   58.50	13.7	24.26   11.96					
14.6	37.80   41.61	14.6	36.22   57.54	14.6	51.38   30.59	14.7	54.18   58.77	14.7	24.40   11.97					
15.6	37.93   41.77	15.6	36.49   57.68	15.6	51.51   30.70	15.7	54.52   59.05	15.7	24.54   12.00					
16.6	38.07   41.95	16.6	36.77   57.84	16.6	51.65   30.82	16.7	54.81   59.32	16.7	24.72   12.04					
17.6	38.21   42.17	17.6	37.05   58.01	17.6	51.79   30.94	17.7	55.10   59.60	17.7	24.89   12.10					
18.6	38.34   42.39	18.6	37.34   58.19	18.6	51.93   31.09	18.7	55.38   59.87	18.7	25.07   12.15					
19.6	38.47   42.63	19.6	37.62   58.41	19.6	52.07   31.27	19.7	55.63   60.12	19.7	25.24   12.24					
20.6	38.59   42.88	20.6	37.89   58.63	20.6	52.20   31.47	20.6	55.88   60.36	20.7	25.40   12.36					
21.6	38.69   43.15	21.6	38.12   58.86	21.6	52.32   31.67	21.6	56.14   60.60	21.7	25.56   12.49					
22.6	38.78   43.41	22.6	38.35   59.11	22.6	52.43   31.87	22.6	56.41   60.84	22.7	25.71   12.62					
23.6	38.87   43.66	23.6	38.54   59.36	23.6	52.53   32.10	23.6	56.70   61.08	23.7	25.85   12.77					
24.6	38.95   43.92	24.6	38.73   59.60	24.6	52.63   32.32	24.6	57.00   61.34	24.7	25.99   12.91					
25.6	39.02   44.16	25.6	38.91   59.83	25.6	52.72   32.52	25.6	57.31   61.60	25.6	26.11   13.06					
26.6	39.09   44.40	26.6	39.07   60.06	26.6	52.80   32.72	26.6	57.62   61.86	26.6	26.23   13.20					
27.6	39.16   44.63	27.6	39.23   60.25	27.6	52.88   32.91	27.6	57.94   62.14	27.6	26.36   13.33					
28.6	39.23   44.84	28.6	39.40   60.46	28.6	52.98   33.07	28.6	58.23   62.46	28.6	26.48   13.47					
29.5	39.31   45.04	29.6	39.59   60.66	29.6	53.08   33.25	29.6	58.52   62.80	29.6	26.60   13.55					
30.5	39.41   45.25	30.6	39.80   60.86	30.6	53.18   33.42	30.6	58.79   63.16	30.6	26.75   13.64					
31.5	39.51   45.47	31.6	40.03   61.07	31.6	53.31   33.59	31.6	59.02   63.50	31.6	26.89   13.75					
32.5	39.62   45.73	32.6	40.27   61.29	32.6	53.44   33.78	32.6	59.21   63.84	32.6	27.07   13.87					
8.32	-8.26	15.85	-15.82	7.02	-6.95	18.20	+18.17	7.63	-7.56					
21 <sup>h</sup> 38 <sup>m</sup>	19°.542	22 <sup>h</sup> 16 <sup>m</sup>	8°.656	22 <sup>h</sup> 37 <sup>m</sup>	39°.016	23 <sup>h</sup> 27 <sup>m</sup>	44°.125	23 <sup>h</sup> 47 <sup>m</sup>	16°.424					
-83° 6'	6''.99	-86° 23'	27''.13	-81° 49'	2''.34	+86° 50'	58''.89	-82° 28'	48''.42					

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '
	0 57	+85 48		1 30	+88 51		1 42	-85 10		4 10	+85 20		5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.7	22.05	45.97	0.7	51.98	42.35	0.7	2.68	43.97	0.8	11.49	2.96	0.9	18.83	20.71
1.7	22.30	46.22	1.7	53.01	42.56	1.7	2.95	43.95	1.8	11.80	2.93	1.9	19.11	20.56
2.7	22.55	46.47	2.7	53.96	42.76	2.7	3.22	43.95	2.8	12.09	2.92	2.9	19.36	20.42
3.7	22.78	46.70	3.7	54.89	42.96	3.7	3.49	43.98	3.8	12.36	2.89	3.9	19.60	20.27
4.7	23.01	46.90	4.7	55.82	43.11	4.7	3.76	44.02	4.8	12.63	2.85	4.9	19.83	20.12
5.7	23.25	47.10	5.7	56.79	43.26	5.7	4.01	44.10	5.8	12.90	2.80	5.9	20.05	19.94
6.7	23.52	47.31	6.7	57.84	43.41	6.7	4.25	44.18	6.8	13.17	2.72	6.9	20.27	19.76
7.7	23.80	47.51	7.7	58.94	43.56	7.7	4.47	44.26	7.8	13.46	2.64	7.9	20.50	19.54
8.7	24.09	47.74	8.7	60.12	43.73	8.7	4.67	44.35	8.8	13.78	2.54	8.9	20.76	19.32
9.7	24.40	47.97	9.7	61.31	43.92	9.7	4.88	44.44	9.8	14.11	2.47	9.8	21.03	19.12
10.7	24.70	48.23	10.7	62.49	44.14	10.7	5.08	44.50	10.8	14.45	2.41	10.8	21.33	18.92
11.6	24.98	48.51	11.7	63.63	44.38	11.7	5.30	44.56	11.8	14.80	2.39	11.8	21.64	18.74
12.6	25.25	48.81	12.7	64.69	44.62	12.7	5.52	44.61	12.8	15.14	2.39	12.8	21.94	18.60
13.6	25.49	49.10	13.7	65.69	44.88	13.7	5.75	44.67	13.8	15.47	2.41	13.8	22.23	18.47
14.6	25.72	49.40	14.7	66.62	45.13	14.7	6.00	44.75	14.8	15.79	2.44	14.8	22.52	18.37
15.6	25.92	49.69	15.7	67.50	45.38	15.7	6.25	44.83	15.8	16.07	2.47	15.8	22.80	18.27
16.6	26.12	49.96	16.7	68.35	45.63	16.7	6.51	44.95	16.8	16.36	2.50	16.8	23.06	18.17
17.6	26.32	50.23	17.7	69.20	45.85	17.7	6.76	45.08	17.8	16.64	2.53	17.8	23.31	18.07
18.6	26.53	50.48	18.7	70.04	46.05	18.7	7.00	45.22	18.8	16.92	2.54	18.8	23.56	17.95
19.6	26.75	50.74	19.7	70.93	46.25	19.7	7.23	45.36	19.8	17.20	2.53	19.8	23.81	17.83
20.6	26.97	51.01	20.8	71.87	46.46	20.7	7.46	45.53	20.8	17.48	2.52	20.8	24.06	17.69
21.6	27.20	51.27	21.6	72.83	46.68	21.7	7.66	45.72	21.8	17.78	2.51	21.8	24.33	17.55
22.6	27.44	51.53	22.6	73.83	46.91	22.7	7.85	45.90	22.8	18.09	2.49	22.8	24.60	17.42
23.6	27.69	51.81	23.6	74.86	47.16	23.6	8.03	46.07	23.8	18.42	2.48	23.8	24.89	17.27
24.6	27.93	52.12	24.6	75.90	47.42	24.6	8.22	46.23	24.7	18.75	2.48	24.8	25.20	17.14
25.6	28.18	52.44	25.6	76.93	47.71	25.6	8.40	46.38	25.7	19.09	2.52	25.8	25.52	17.04
26.6	28.42	52.79	26.6	77.91	48.02	26.6	8.59	46.50	26.7	19.46	2.58	26.8	25.86	16.93
27.6	28.63	53.14	27.6	78.82	48.34	27.6	8.79	46.63	27.7	19.80	2.67	27.8	26.20	16.86
28.6	28.82	53.49	28.6	79.65	48.68	28.6	9.00	46.76	28.7	20.14	2.78	28.8	26.52	16.81
29.6	28.99	53.84	29.6	80.40	48.99	29.6	9.23	46.90	29.7	20.46	2.89	29.8	26.84	16.78
30.6	29.14	54.18	30.6	81.11	49.29	30.6	9.45	47.06	30.7	20.75	2.99	30.8	27.13	16.75
31.6	29.29	54.52	31.6	81.79	49.58	31.6	9.67	47.24	31.7	21.03	3.09	31.8	27.41	16.71
13.70	+13.66		50.38	+50.37		11.90	-11.86		12.29	+12.25		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 43' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

## CIRCUMPOLAR STARS.

**FOR THE UPPER TRANSIT AT WASHINGTON.**

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Aug.	h m 5 45	° ' -84 49	Aug.	h m 6 46	° ' -80 43	Aug.	h m 7 2	° ' +87 10	Aug.	h m 7 13	° ' +82 34	Aug.	h m 7 15	° ' -86 53
	s "			s "			s "			s "			s "	
0.9	52.55	31.22	0.9	46.32	31.63	0.9	6.99	44.14	0.9	44.88	19.99	0.9	37.27	65.39
1.9	52.67	30.94	1.9	46.36	31.32	1.9	7.33	43.87	1.9	45.02	19.72	1.9	37.31	65.07
2.9	52.80	30.65	2.9	46.41	31.00	2.9	7.67	43.62	2.9	45.14	19.48	2.9	37.39	64.74
3.9	52.95	30.35	3.9	46.46	30.66	3.9	7.95	43.39	3.9	45.24	19.23	3.9	37.48	64.39
4.9	53.12	30.08	4.9	46.52	30.35	4.9	8.22	43.13	4.9	45.34	18.97	4.9	37.61	64.07
5.9	53.29	29.84	5.9	46.59	30.06	5.9	8.47	42.86	5.9	45.44	18.71	5.9	37.77	63.77
6.9	53.46	29.63	6.9	46.67	29.80	6.9	8.72	42.58	6.9	45.52	18.42	6.9	37.94	63.49
7.9	53.64	29.43	7.9	46.74	29.55	7.9	8.99	42.28	7.9	45.62	18.11	7.9	38.12	63.24
8.9	53.81	29.26	8.9	46.81	29.31	8.9	9.30	41.97	8.9	45.73	17.80	8.9	38.28	63.00
9.9	53.96	29.08	9.9	46.88	29.09	9.9	9.62	41.64	9.9	45.86	17.48	9.9	38.43	62.76
10.9	54.09	28.89	10.9	46.95	28.86	10.9	9.98	41.32	10.9	45.99	17.16	10.9	38.57	62.51
11.9	54.24	28.71	11.9	47.02	28.61	11.9	10.37	41.02	11.9	46.14	16.86	11.9	38.70	62.25
12.8	54.39	28.50	12.9	47.08	28.35	12.9	10.78	40.75	12.9	46.29	16.59	12.9	38.83	62.00
13.8	54.56	28.27	13.9	47.15	28.07	13.9	11.18	40.51	13.9	46.44	16.34	13.9	38.97	61.72
14.8	54.73	28.04	14.9	47.22	27.79	14.9	11.57	40.28	14.9	46.60	16.10	14.9	39.13	61.42
15.8	54.90	27.80	15.9	47.30	27.51	15.9	11.94	40.06	15.9	46.74	15.88	15.9	39.30	61.11
16.8	55.09	27.58	16.9	47.38	27.22	16.9	12.30	39.85	16.9	46.88	15.66	16.9	39.49	60.80
17.8	55.30	27.37	17.9	47.47	26.94	17.9	12.64	39.63	17.9	47.01	15.43	17.9	39.71	60.51
18.8	55.50	27.17	18.9	47.57	26.68	18.9	12.98	39.41	18.9	47.13	15.20	18.9	39.93	60.23
19.8	55.72	26.99	19.9	47.67	26.43	19.9	13.31	39.16	19.9	47.25	14.96	19.9	40.18	59.97
20.8	55.94	26.84	20.9	47.77	26.21	20.9	13.64	38.92	20.9	47.37	14.71	20.9	40.43	59.72
21.8	56.14	26.71	21.9	47.87	26.00	21.9	13.98	38.66	21.9	47.50	14.44	21.9	40.70	59.49
22.8	56.35	26.58	22.9	47.97	25.80	22.9	14.34	38.39	22.9	47.63	14.18	22.9	40.97	59.27
23.8	56.56	26.47	23.9	48.06	25.60	23.9	14.72	38.13	23.9	47.77	13.91	23.9	41.22	59.07
24.8	56.75	26.36	24.9	48.16	25.42	24.9	15.14	37.87	24.9	47.93	13.63	24.9	41.46	58.89
25.8	56.94	26.24	25.9	48.25	25.24	25.9	15.60	37.61	25.9	48.10	13.38	25.9	41.69	58.69
26.8	57.12	26.10	26.9	48.34	25.06	26.9	16.07	37.37	26.9	48.27	13.14	26.9	41.90	58.48
27.8	57.30	25.96	27.8	48.43	24.85	27.9	16.56	37.16	27.9	48.46	12.91	27.9	42.11	58.25
28.8	57.49	25.79	28.8	48.53	24.63	28.9	17.04	36.97	28.9	48.65	12.71	28.9	42.32	58.02
29.8	57.70	25.62	29.8	48.62	24.40	29.9	17.52	36.78	29.9	48.83	12.52	29.9	42.55	57.76
30.8	57.92	25.47	30.8	48.73	24.17	30.9	17.97	36.61	30.9	49.01	12.35	30.9	42.82	57.52
31.8	58.15	25.32	31.8	48.84	23.95	31.8	18.39	36.45	31.9	49.16	12.18	31.9	43.10	57.26
11.09	-11.04		6.20	-6.12		20.31	+20.28		7.73	+7.67		18.49	-18.47	
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '
	8 15	+88 52		9 8	-85 20		9 25	+81 41		9 36	-80 34		10 21	+82 58
	s	"		s	"		s	"		s	"		s	"
0.9	39.83	50.08	1.0	33.50	13.66	1.0	21.67	33.31	1.0	12.65	26.43	1.1	3.20	47.51
1.9	40.35	49.76	2.0	33.40	13.36	2.0	21.70	32.97	2.0	12.60	26.13	2.1	3.20	47.18
2.9	40.83	49.45	3.0	33.31	13.04	3.0	21.73	32.64	3.0	12.54	25.81	3.1	3.18	46.85
3.9	41.26	49.14	4.0	33.25	12.70	4.0	21.74	32.34	4.0	12.50	25.48	4.1	3.15	46.54
4.9	41.62	48.83	5.0	33.20	12.35	5.0	21.75	32.04	5.0	12.46	25.15	5.1	3.12	46.24
5.9	41.94	48.52	6.0	33.18	12.04	6.0	21.74	31.74	6.0	12.44	24.82	6.1	3.07	45.94
6.9	42.21	48.19	7.0	33.18	11.72	7.0	21.74	31.40	7.0	12.43	24.51	7.1	3.01	45.63
7.9	42.51	47.83	8.0	33.18	11.42	8.0	21.73	31.04	8.0	12.43	24.22	8.1	2.95	45.29
8.9	42.86	47.46	8.9	33.19	11.13	9.0	21.73	30.67	9.0	12.42	23.94	9.0	2.90	44.92
9.9	43.29	47.07	9.9	33.19	10.86	10.0	21.74	30.28	10.0	12.42	23.67	10.0	2.86	44.53
10.9	43.81	46.69	10.9	33.20	10.60	11.0	21.77	29.89	11.0	12.41	23.42	11.0	2.84	44.14
11.9	44.40	46.32	11.9	33.19	10.34	12.0	21.81	29.50	12.0	12.39	23.15	12.0	2.83	43.75
12.9	45.04	45.98	12.9	33.16	10.07	12.9	21.86	29.14	13.0	12.38	22.88	13.0	2.82	43.37
13.9	45.71	45.64	13.9	33.13	9.75	13.9	21.91	28.79	14.0	12.36	22.56	14.0	2.83	43.00
14.9	46.38	45.33	14.9	33.11	9.45	14.9	21.96	28.45	15.0	12.34	22.26	15.0	2.85	42.65
15.9	47.03	45.02	15.9	33.10	9.12	15.9	22.01	28.11	15.9	12.32	21.94	16.0	2.86	42.32
16.9	47.65	44.73	16.9	33.11	8.78	16.9	22.05	27.79	16.9	12.31	21.59	17.0	2.86	41.98
17.9	48.23	44.45	17.9	33.12	8.44	17.9	22.09	27.48	17.9	12.30	21.26	18.0	2.86	41.66
18.9	48.79	44.16	18.9	33.15	8.11	18.9	22.13	27.16	18.9	12.30	20.91	19.0	2.86	41.34
19.9	49.31	43.85	19.9	33.19	7.77	19.9	22.15	26.84	19.9	12.30	20.57	20.0	2.85	41.02
20.9	49.83	43.55	20.9	33.25	7.45	20.9	22.18	26.51	20.9	12.32	20.23	21.0	2.83	40.69
21.9	50.36	43.24	21.9	33.32	7.14	21.9	22.21	26.17	21.9	12.34	19.91	22.0	2.81	40.33
22.9	50.92	42.90	22.9	33.40	6.85	22.9	22.24	25.81	22.9	12.37	19.62	23.0	2.79	39.97
23.9	51.54	42.56	23.9	33.48	6.57	23.9	22.27	25.44	23.9	12.40	19.34	24.0	2.78	39.59
24.9	52.24	42.21	24.9	33.54	6.31	24.9	22.31	25.07	24.9	12.43	19.07	25.0	2.78	39.21
25.9	53.01	41.88	25.9	33.60	6.05	25.9	22.38	24.68	25.9	12.46	18.80	26.0	2.81	38.79
26.9	53.88	41.54	26.9	33.65	5.79	26.9	22.46	24.29	26.9	12.47	18.53	26.9	2.84	38.39
27.9	54.80	41.22	27.9	33.69	5.52	27.9	22.55	23.93	27.9	12.48	18.26	27.9	2.89	38.00
28.9	55.75	40.94	28.9	33.73	5.21	28.9	22.64	23.58	28.9	12.49	17.95	28.9	2.95	37.61
29.9	56.68	40.67	29.9	33.77	4.90	29.9	22.73	23.24	29.9	12.49	17.63	29.9	3.00	37.24
30.9	57.57	40.41	30.9	33.82	4.58	30.9	22.82	22.93	30.9	12.51	17.31	30.9	3.05	36.90
31.9	58.38	40.14	31.9	33.91	4.26	31.9	22.89	22.62	31.9	12.54	16.97	31.9	3.10	36.57
51.12	+51.11		12.30	-12.26		6.92	+6.85		6.11	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".07		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\gamma$ Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			$\iota$ Octantis. Mag. 5.4			32 H. Camelopardalis seq. Mag. 5.3			$\kappa$ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "	Aug.	h m s	° ' "
	10 59	-84 9		12 13	+88 9		12 46	-84 40		12 48	+83 51		13 27	-85 22
1.1	43.94	20.27	1.1	69.23	33.87	1.2	5.80	58.57	1.2	26.55	50.16	1.2	18.06	19.03
2.1	43.80	20.06	2.1	68.82	33.59	2.2	5.58	58.49	2.2	26.41	49.91	2.2	17.81	19.00
3.1	43.65	19.82	3.1	68.42	33.34	3.2	5.36	58.39	3.2	26.28	49.68	3.2	17.54	18.95
4.1	43.50	19.55	4.1	68.01	33.09	4.2	5.13	58.25	4.2	26.13	49.47	4.2	17.27	18.87
5.1	43.36	19.28	5.1	67.57	32.85	5.2	4.92	58.09	5.2	25.99	49.28	5.2	17.02	18.77
6.1	43.26	19.00	6.1	67.10	32.61	6.2	4.73	57.92	6.2	25.81	49.10	6.2	16.77	18.65
7.1	43.16	18.72	7.1	66.58	32.38	7.2	4.56	57.75	7.2	25.64	48.90	7.2	16.54	18.51
8.1	43.07	18.46	8.1	66.02	32.12	8.2	4.40	57.59	8.2	25.45	48.68	8.2	16.33	18.38
9.1	43.01	18.23	9.1	65.46	31.84	9.1	4.25	57.41	9.2	25.27	48.45	9.2	16.14	18.27
10.1	42.93	18.00	10.1	64.93	31.53	10.1	4.11	57.26	10.1	25.09	48.20	10.2	15.96	18.17
11.1	42.85	17.77	11.1	64.41	31.22	11.1	3.97	57.12	11.1	24.92	47.93	11.2	15.77	18.08
12.1	42.77	17.55	12.1	63.95	30.89	12.1	3.81	57.00	12.1	24.76	47.65	12.2	15.58	17.99
13.1	42.68	17.32	13.1	63.54	30.55	13.1	3.64	56.86	13.1	24.62	47.36	13.2	15.37	17.90
14.1	42.57	17.06	14.1	63.17	30.23	14.1	3.46	56.72	14.1	24.48	47.07	14.2	15.15	17.81
15.1	42.47	16.79	15.1	62.83	29.91	15.1	3.28	56.56	15.1	24.35	46.78	15.2	14.91	17.70
16.1	42.37	16.52	16.1	62.50	29.60	16.1	3.09	56.38	16.1	24.24	46.52	16.2	14.67	17.57
17.1	42.26	16.22	17.1	62.17	29.31	17.1	2.89	56.19	17.1	24.12	46.25	17.2	14.42	17.42
18.1	42.17	15.90	18.1	61.84	29.02	18.1	2.70	55.97	18.1	23.99	46.00	18.2	14.18	17.25
19.0	42.10	15.58	19.1	61.49	28.72	19.1	2.52	55.73	19.1	23.86	45.75	19.2	13.94	17.06
20.0	42.04	15.26	20.1	61.11	28.45	20.1	2.36	55.48	20.1	23.72	45.51	20.1	13.71	16.86
21.0	41.97	14.94	21.1	60.70	28.16	21.1	2.21	55.24	21.1	23.57	45.26	21.1	13.51	16.66
22.0	41.93	14.63	22.1	60.28	27.86	22.1	2.07	55.00	22.1	23.43	45.00	22.1	13.32	16.45
23.0	41.89	14.34	23.1	59.86	27.54	23.1	1.95	54.75	23.1	23.28	44.72	23.1	13.14	16.24
24.0	41.87	14.06	24.1	59.43	27.20	24.1	1.84	54.52	24.1	23.12	44.42	24.1	12.99	16.05
25.0	41.84	13.79	25.1	59.02	26.84	25.1	1.73	54.31	25.1	22.97	44.10	25.1	12.83	15.89
26.0	41.81	13.55	26.1	58.66	26.48	26.1	1.62	54.11	26.1	22.83	43.76	26.1	12.66	15.74
27.0	41.77	13.31	27.1	58.34	26.09	27.1	1.49	53.93	27.1	22.72	43.41	27.1	12.49	15.59
28.0	41.72	13.04	28.1	58.08	25.69	28.1	1.36	53.75	28.1	22.61	43.06	28.1	12.32	15.44
29.0	41.66	12.75	29.1	57.85	25.31	29.1	1.22	53.52	29.1	22.52	42.72	29.1	12.13	15.27
30.0	41.60	12.44	30.1	57.66	24.94	30.1	1.06	53.30	30.1	22.44	42.37	30.1	11.91	15.08
31.0	41.54	12.12	31.1	57.48	24.61	31.1	0.90	53.06	31.1	22.35	42.05	31.1	11.69	14.88
32.0	41.50	11.79	32.1	57.27	24.27	32.1	0.75	52.79	32.1	22.26	41.73	32.1	11.49	14.66
9.82	-9.77		31.12	+31.10		10.79	-10.74		9.35	+9.30		12.39	-12.35	
10 <sup>h</sup> 59 <sup>m</sup>	55°.280		12 <sup>h</sup> 14 <sup>m</sup>	28°.425		12 <sup>h</sup> 46 <sup>m</sup>	7°.152		12 <sup>h</sup> 48 <sup>m</sup>	30°.418		13 <sup>h</sup> 27 <sup>m</sup>	14°.624	
-84° 8'	50''.60		+88° 9'	36''.08		-84° 40'	22''.34		+83° 51'	50''.47		-85° 21'	42''.23	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '
	14 13	-83 17		15 3	+87 33		15 24	-84 12		16 54	+82 10		17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
1.2	35.28	56.67	1.3	29.26	16.12	1.3	11.88	1.94	1.3	25.58	42.50	1.4	10.90	25.20
2.2	35.12	56.73	2.3	28.73	16.05	2.3	11.70	2.07	2.3	25.42	42.61	2.4	10.82	25.45
3.2	34.94	56.72	3.3	28.23	15.98	3.3	11.50	2.18	3.3	25.28	42.70	3.4	10.75	25.69
4.2	34.75	56.69	4.3	27.74	15.94	4.3	11.30	2.28	4.3	25.13	42.82	4.4	10.66	25.92
5.2	34.56	56.67	5.3	27.23	15.91	5.3	11.08	2.34	5.3	24.99	42.96	5.3	10.56	26.11
6.2	34.39	56.61	6.3	26.72	15.90	6.3	10.88	2.38	6.3	24.84	43.11	6.3	10.45	26.28
7.2	34.22	56.52	7.3	26.16	15.89	7.3	10.69	2.38	7.3	24.69	43.27	7.3	10.36	26.42
8.2	34.08	56.43	8.2	25.59	15.88	8.3	10.51	2.38	8.3	24.52	43.45	8.3	10.26	26.55
9.2	33.93	56.37	9.2	24.99	15.85	9.3	10.34	2.38	9.3	24.36	43.63	9.3	10.17	26.67
10.2	33.79	56.32	10.2	24.37	15.81	10.3	10.18	2.41	10.3	24.19	43.77	10.3	10.09	26.79
11.2	33.66	56.27	11.2	23.76	15.72	11.3	10.03	2.45	11.3	24.00	43.90	11.3	10.02	26.93
12.2	33.53	56.22	12.2	23.16	15.63	12.3	9.88	2.50	12.3	23.83	44.01	12.3	9.95	27.11
13.2	33.39	56.18	13.2	22.58	15.53	13.2	9.70	2.54	13.3	23.65	44.11	13.3	9.87	27.27
14.2	33.22	56.15	14.2	22.03	15.41	14.2	9.52	2.58	14.3	23.49	44.19	14.3	9.79	27.45
15.2	33.05	56.11	15.2	21.51	15.29	15.2	9.32	2.63	15.3	23.32	44.24	15.3	9.69	27.63
16.2	32.87	56.02	16.2	21.00	15.18	16.2	9.13	2.66	16.3	23.15	44.29	16.3	9.59	27.81
17.2	32.70	55.95	17.2	20.51	15.08	17.2	8.90	2.67	17.3	23.00	44.35	17.3	9.48	27.95
18.2	32.51	55.82	18.2	20.01	14.98	18.2	8.68	2.67	18.3	22.85	44.41	18.3	9.35	28.10
19.2	32.32	55.70	19.2	19.51	14.89	19.2	8.46	2.65	19.3	22.68	44.49	19.3	9.22	28.23
20.2	32.16	55.57	20.2	19.01	14.81	20.2	8.25	2.61	20.3	22.51	44.57	20.3	9.10	28.33
21.2	32.01	55.42	21.2	18.48	14.72	21.2	8.05	2.55	21.3	22.35	44.66	21.3	8.97	28.42
22.2	31.86	55.25	22.2	17.93	14.65	22.2	7.85	2.50	22.3	22.18	44.76	22.3	8.85	28.50
23.2	31.72	55.09	23.2	17.35	14.57	23.2	7.66	2.43	23.3	22.01	44.86	23.3	8.75	28.56
24.2	31.59	54.94	24.2	16.76	14.46	24.2	7.49	2.36	24.3	21.82	44.95	24.3	8.64	28.62
25.2	31.45	54.80	25.2	16.16	14.32	25.2	7.33	2.29	25.3	21.64	45.01	25.3	8.54	28.69
26.2	31.34	54.69	26.2	15.57	14.17	26.2	7.17	2.26	26.3	21.45	45.06	26.3	8.46	28.77
27.2	31.21	54.59	27.2	15.00	13.98	27.2	7.01	2.24	27.3	21.26	45.08	27.3	8.37	28.86
28.2	31.07	54.47	28.2	14.44	13.79	28.2	6.84	2.22	28.3	21.07	45.08	28.3	8.27	28.99
29.2	30.92	54.38	29.2	13.93	13.58	29.2	6.67	2.19	29.3	20.89	45.06	29.3	8.18	29.11
30.2	30.76	54.24	30.2	13.45	13.38	30.2	6.46	2.15	30.3	20.71	45.03	30.3	8.05	29.21
31.2	30.60	54.11	31.2	12.98	13.18	31.2	6.24	2.10	31.3	20.54	45.00	31.3	7.93	29.32
32.1	30.43	53.95	32.2	12.52	13.00	32.2	6.02	2.01	32.3	20.37	45.00	32.3	7.80	29.39
8.57	-8.51		23.43	+23.41		9.90	-9.85		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup>	27°.793		15 <sup>h</sup> 3 <sup>m</sup>	41°.175		15 <sup>h</sup> 23 <sup>m</sup>	56°.594		16 <sup>h</sup> 54 <sup>m</sup>	25°.488		17 <sup>h</sup> 15 <sup>m</sup>	54°.896	
-83° 17'	21''.03		+87° 33'	10''.52		-84° 11'	30''.39		+82° 10'	32''.75		-80° 47'	6''.56	



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursæ Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursæ Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.
Aug.	h m 17 58 s	° ' +86 37 "	Aug.	h m 18 7 s	° ' -87 40 "	Aug.	h m 19 2 s	° ' +89 1 "	Aug.	h m 19 30 s	° ' -89 13 "	Aug.	h m 20 48 s	° ' +82 13 "
1.4	60.70	1.97	1.4	12.34	3.88	1.4	41.82	13.21	1.5	48.67	27.56	1.5	45.82	40.51
2.4	60.37	2.17	2.4	12.14	4.17	2.4	40.92	13.48	2.4	48.61	27.88	2.5	45.78	40.85
3.4	60.06	2.36	3.4	11.90	4.47	3.4	40.06	13.72	3.4	48.42	28.21	3.5	45.75	41.18
4.4	59.77	2.55	4.4	11.62	4.76	4.4	39.28	13.99	4.4	48.09	28.54	4.5	45.72	41.51
5.4	59.49	2.77	5.4	11.29	5.01	5.4	38.54	14.25	5.4	47.65	28.84	5.5	45.70	41.83
6.4	59.21	2.99	6.4	10.95	5.25	6.4	37.82	14.52	6.4	47.09	29.13	6.5	45.69	42.19
7.4	58.90	3.23	7.4	10.61	5.44	7.4	37.09	14.84	7.4	46.51	29.40	7.5	45.67	42.55
8.4	58.59	3.47	8.4	10.28	5.64	8.4	36.32	15.16	8.4	45.93	29.65	8.5	45.66	42.93
9.4	58.27	3.73	9.4	10.00	5.82	9.4	35.44	15.49	9.4	45.43	29.89	9.5	45.65	43.33
10.4	57.90	3.97	10.4	9.72	6.00	10.4	34.49	15.81	10.4	44.98	30.13	10.5	45.61	43.74
11.4	57.53	4.21	11.4	9.47	6.20	11.4	33.46	16.10	11.4	44.59	30.38	11.5	45.57	44.15
12.4	57.16	4.41	12.4	9.21	6.42	12.4	32.37	16.40	12.4	44.22	30.65	12.5	45.53	44.54
13.4	56.77	4.58	13.4	8.94	6.66	13.4	31.26	16.66	13.4	43.85	30.93	13.5	45.47	44.91
14.4	56.40	4.74	14.4	8.64	6.89	14.4	30.17	16.89	14.4	43.42	31.22	14.5	45.41	45.26
15.4	56.03	4.89	15.4	8.32	7.13	15.4	29.08	17.12	15.4	42.92	31.52	15.5	45.35	45.60
16.3	55.68	5.03	16.4	7.96	7.38	16.4	28.05	17.34	16.4	42.32	31.82	16.5	45.29	45.93
17.3	55.34	5.18	17.4	7.58	7.61	17.4	27.05	17.57	17.4	41.62	32.12	17.5	45.23	46.23
18.3	55.01	5.33	18.3	7.16	7.82	18.4	26.08	17.80	18.4	40.82	32.42	18.5	45.17	46.55
19.3	54.67	5.50	19.3	6.72	8.02	19.4	25.14	18.04	19.4	39.95	32.69	19.5	45.11	46.88
20.3	54.33	5.68	20.3	6.28	8.20	20.4	24.20	18.28	20.4	39.02	32.95	20.5	45.06	47.22
21.3	54.00	5.87	21.3	5.84	8.35	21.4	23.23	18.55	21.4	38.05	33.19	21.5	45.01	47.57
22.3	53.63	6.06	22.3	5.40	8.50	22.4	22.24	18.83	22.4	37.10	33.42	22.4	44.96	47.93
23.3	53.27	6.24	23.3	4.98	8.66	23.4	21.19	19.10	23.4	36.15	33.66	23.4	44.91	48.29
24.3	52.87	6.43	24.3	4.59	8.79	24.4	20.06	19.37	24.4	35.28	33.85	24.4	44.86	48.68
25.3	52.46	6.61	25.3	4.22	8.90	25.4	18.84	19.64	25.4	34.46	34.04	25.4	44.78	49.06
26.3	52.03	6.76	26.3	3.88	9.05	26.4	17.55	19.89	26.4	33.72	34.26	26.4	44.70	49.45
27.3	51.60	6.90	27.3	3.55	9.20	27.4	16.21	20.12	27.4	33.03	34.48	27.4	44.61	49.82
28.3	51.17	7.00	28.3	3.19	9.38	28.4	14.85	20.31	28.4	32.33	34.72	28.4	44.51	50.15
29.3	50.74	7.08	29.3	2.82	9.56	29.4	13.48	20.51	29.4	31.57	35.00	29.4	44.41	50.48
30.3	50.33	7.14	30.3	2.41	9.74	30.4	12.19	20.68	30.4	30.71	35.26	30.4	44.31	50.79
31.3	49.94	7.22	31.3	1.94	9.91	31.3	10.95	20.85	31.4	29.71	35.52	31.4	44.21	51.08
32.3	49.56	7.31	32.3	1.45	10.06	32.3	9.78	21.02	32.4	28.60	35.77	32.4	44.12	51.37
16.95	+16.92		24.58	-24.56		58.55	+58.54		73.97	-73.97		7.40	+7.33	
17 <sup>h</sup> 59 <sup>m</sup> 1 <sup>s</sup> .307			18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51''.17			-87° 39' 51''.82			+89° 1' 2''.17			-89° 13' 28''.57			+82° 13' 29''.86		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '	Aug.	h m	° '
	21 38	-83 5		22 16	-86 23		22 37	-81 48		23 27	+86 51		23 47	-82 28
	s	"		s	"		s	"		s	"		s	"
1.5	39.62	45.73	1.6	40.27	1.29	1.6	53.44	33.78	1.6	59.21	3.84	1.6	27.07	13.87
2.5	39.72	45.99	2.6	40.49	1.53	2.6	53.54	34.00	2.6	59.39	4.16	2.6	27.22	14.01
3.5	39.82	46.27	3.6	40.70	1.80	3.6	53.65	34.24	3.6	59.58	4.46	3.6	27.37	14.18
4.5	39.88	46.59	4.6	40.89	2.07	4.6	53.75	34.51	4.6	59.76	4.75	4.6	27.51	14.37
5.5	39.93	46.90	5.6	41.03	2.36	5.6	53.83	34.77	5.6	59.97	5.04	5.6	27.64	14.59
6.5	39.97	47.19	6.6	41.14	2.65	6.6	53.89	35.03	6.6	60.20	5.33	6.6	27.75	14.80
7.5	39.99	47.47	7.6	41.24	2.94	7.6	53.95	35.29	7.6	60.45	5.63	7.6	27.85	14.99
8.5	40.02	47.75	8.5	41.33	3.18	8.6	54.00	35.53	8.6	60.72	5.95	8.6	27.94	15.20
9.5	40.05	47.98	9.5	41.42	3.43	9.6	54.06	35.75	9.6	60.97	6.31	9.6	28.03	15.38
10.5	40.08	48.21	10.5	41.53	3.66	10.6	54.12	35.98	10.6	61.22	6.67	10.6	28.13	15.57
11.5	40.13	48.44	11.5	41.65	3.89	11.6	54.20	36.19	11.6	61.45	7.04	11.6	28.23	15.74
12.5	40.18	48.68	12.5	41.79	4.12	12.6	54.28	36.40	12.6	61.63	7.42	12.6	28.36	15.89
13.5	40.24	48.96	13.5	41.93	4.39	13.5	54.36	36.63	13.6	61.80	7.80	13.6	28.48	16.08
14.5	40.29	49.24	14.5	42.08	4.67	14.5	54.44	36.88	14.6	61.94	8.15	14.6	28.61	16.27
15.5	40.34	49.54	15.5	42.22	4.95	15.5	54.52	37.15	15.6	62.07	8.51	15.6	28.73	16.48
16.5	40.39	49.86	16.5	42.34	5.26	16.5	54.59	37.44	16.6	62.20	8.84	16.6	28.85	16.70
17.5	40.41	50.19	17.5	42.44	5.58	17.5	54.64	37.75	17.6	62.32	9.16	17.6	28.95	16.96
18.5	40.42	50.52	18.5	42.53	5.91	18.5	54.69	38.06	18.6	62.45	9.49	18.6	29.06	17.22
19.5	40.43	50.83	19.5	42.57	6.25	19.5	54.74	38.37	19.6	62.59	9.80	19.6	29.15	17.49
20.5	40.42	51.14	20.5	42.61	6.57	20.5	54.77	38.68	20.6	62.75	10.13	20.6	29.23	17.77
21.5	40.40	51.44	21.5	42.63	6.88	21.5	54.80	38.97	21.6	62.92	10.45	21.6	29.31	18.04
22.5	40.38	51.73	22.5	42.64	7.16	22.5	54.82	39.25	22.6	63.09	10.80	22.6	29.37	18.31
23.5	40.36	52.00	23.5	42.65	7.45	23.5	54.84	39.53	23.6	63.27	11.16	23.6	29.43	18.57
24.5	40.34	52.26	24.5	42.65	7.72	24.5	54.87	39.78	24.6	63.45	11.54	24.6	29.49	18.81
25.5	40.34	52.52	25.5	42.69	7.98	25.5	54.89	40.03	25.6	63.59	11.94	25.6	29.57	19.03
26.5	40.34	52.77	26.5	42.72	8.22	26.5	54.93	40.27	26.5	63.72	12.34	26.6	29.64	19.24
27.5	40.35	53.03	27.5	42.78	8.49	27.5	54.96	40.51	27.5	63.81	12.76	27.6	29.72	19.46
28.5	40.37	53.31	28.5	42.86	8.76	28.5	55.01	40.78	28.5	63.87	13.18	28.6	29.81	19.69
29.5	40.38	53.60	29.5	42.92	9.06	29.5	55.06	41.06	29.5	63.93	13.57	29.6	29.91	19.94
30.5	40.39	53.92	30.5	42.97	9.37	30.5	55.10	41.38	30.5	63.96	13.94	30.6	30.01	20.21
31.5	40.36	54.23	31.5	42.99	9.70	31.5	55.13	41.69	31.5	63.99	14.30	31.5	30.09	20.49
32.5	40.33	54.55	32.5	43.00	10.03	32.5	55.14	42.02	32.5	64.04	14.66	32.5	30.14	20.81
8.32	-8.26		15.86	-15.83		7.02	-6.95		18.21	+18.18		7.63	-7.56	
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "
	0 57	+85 48		1 31	+88 51		1 42	-85 10		4 10	+85 20		5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.6	29.29	54.52	0.6	21.79	49.58	0.6	9.67	47.24	0.7	21.03	3.09	0.8	27.41	16.71
1.6	29.44	54.82	1.6	22.51	49.86	1.6	9.87	47.47	1.7	21.31	3.17	1.8	27.68	16.67
2.6	29.62	55.11	2.6	23.28	50.12	2.6	10.06	47.70	2.7	21.59	3.23	2.8	27.95	16.61
3.6	29.81	55.42	3.6	24.11	50.38	3.6	10.24	47.95	3.7	21.90	3.28	3.8	28.23	16.53
4.6	30.01	55.73	4.6	25.00	50.66	4.6	10.39	48.19	4.7	22.21	3.32	4.8	28.51	16.43
5.6	30.24	56.05	5.6	25.94	50.94	5.6	10.52	48.42	5.7	22.54	3.36	5.8	28.84	16.33
6.6	30.44	56.41	6.6	26.85	51.26	6.6	10.66	48.65	6.7	22.88	3.44	6.8	29.16	16.24
7.6	30.65	56.77	7.6	27.74	51.57	7.6	10.80	48.85	7.7	23.22	3.53	7.8	29.50	16.19
8.6	30.83	57.15	8.6	28.56	51.92	8.6	10.96	49.06	8.7	23.57	3.65	8.8	29.85	16.17
9.6	30.99	57.53	9.6	29.30	52.28	9.6	11.13	49.25	9.7	23.91	3.78	9.8	30.19	16.16
10.6	31.13	57.90	10.6	29.97	52.65	10.6	11.30	49.45	10.7	24.22	3.93	10.8	30.52	16.16
11.6	31.25	58.27	11.6	30.57	53.00	11.6	11.47	49.66	11.7	24.51	4.09	11.8	30.81	16.17
12.6	31.36	58.64	12.6	31.12	53.34	12.6	11.65	49.90	12.7	24.81	4.24	12.8	31.11	16.20
13.6	31.46	58.98	13.6	31.68	53.67	13.6	11.83	50.16	13.7	25.08	4.39	13.8	31.40	16.21
14.6	31.57	59.32	14.6	32.22	53.98	14.6	11.98	50.43	14.7	25.35	4.53	14.8	31.68	16.22
15.6	31.67	59.65	15.6	32.78	54.30	15.6	12.14	50.72	15.7	25.61	4.67	15.7	31.96	16.23
16.6	31.80	59.97	16.6	33.37	54.58	16.6	12.28	51.01	16.7	25.88	4.78	16.7	32.23	16.20
17.5	31.93	60.30	17.6	34.00	54.86	17.6	12.41	51.31	17.7	26.16	4.89	17.7	32.51	16.17
18.5	32.06	60.64	18.6	34.65	55.17	18.6	12.51	51.61	18.7	26.45	4.99	18.7	32.81	16.16
19.5	32.20	60.98	19.6	35.35	55.49	19.6	12.61	51.91	19.7	26.75	5.12	19.7	33.12	16.14
20.5	32.35	61.35	20.6	36.06	55.83	20.6	12.71	52.19	20.7	27.06	5.24	20.7	33.44	16.13
21.5	32.50	61.72	21.6	36.77	56.19	21.6	12.79	52.48	21.7	27.38	5.38	21.7	33.77	16.11
22.5	32.64	62.13	22.6	37.41	56.56	22.6	12.88	52.73	22.7	27.72	5.56	22.7	34.11	16.14
23.5	32.75	62.54	23.6	38.00	56.97	23.6	12.98	52.97	23.7	28.05	5.75	23.7	34.46	16.19
24.5	32.84	62.95	24.6	38.51	57.39	24.6	13.08	53.21	24.7	28.35	5.98	24.7	34.80	16.27
25.5	32.90	63.36	25.6	38.95	57.78	25.6	13.21	53.46	25.7	28.64	6.20	25.7	35.14	16.36
26.5	32.96	63.75	26.5	39.29	58.16	26.6	13.33	53.73	26.7	28.93	6.42	26.7	35.46	16.45
27.5	33.00	64.13	27.5	39.62	58.53	27.6	13.46	54.00	27.7	29.17	6.65	27.7	35.74	16.54
28.5	33.04	64.50	28.5	39.95	58.87	28.5	13.56	54.30	28.7	29.42	6.85	28.7	36.03	16.62
29.5	33.10	64.84	29.5	40.33	59.22	29.5	13.66	54.63	29.7	29.66	7.04	29.7	36.29	16.68
30.5	33.17	65.18	30.5	40.77	59.54	30.5	13.73	54.95	30.6	29.93	7.21	30.7	36.57	16.72
31.5	33.26	65.54	31.5	41.26	59.86	31.5	13.78	55.29	31.6	30.19	7.37	31.7	36.85	16.75
13.71	+13.67		50.49	+50.48		11.90	-11.86		12.29	+12.25		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup>	9 <sup>s</sup> .300		1 <sup>h</sup> 30 <sup>m</sup>	13 <sup>s</sup> .156		1 <sup>h</sup> 42 <sup>m</sup>	2 <sup>s</sup> .339		4 <sup>h</sup> 10 <sup>m</sup>	2 <sup>s</sup> .561		5 <sup>h</sup> 35 <sup>m</sup>	12 <sup>s</sup> .782	
+85° 48'	45'' 30		+88° 51'	43'' 55		-85° 11'	21'' 46		+85° 20'	10'' 34		+85° 9'	30'' 24	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensse. Mag. 6.2			ζ Mensse. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m    ° ' "		Sept.	h m    ° ' "		Sept.	h m    ° ' "		Sept.	h m    ° ' "		Sept.	h m    ° ' "	
	5 45    -84 49			6 46    -80 43			7 2    +87 10			7 13    +82 34			7 15    -86 53	
0.8	58.15    25.32		0.8	48.84    23.95		0.8	18.39    36.45		0.9	49.16    12.18		0.9	43.10    57.26	
1.8	58.38    25.21		1.8	48.96    23.75		1.8	18.79    36.27		1.9	49.31    11.99		1.9	43.41    57.02	
2.8	58.62    25.10		2.8	49.08    23.58		2.8	19.18    36.07		2.9	49.46    11.79		2.9	43.74    56.82	
3.8	58.86    25.05		3.8	49.20    23.44		3.8	19.58    35.86		3.8	49.61    11.57		3.9	44.08    56.63	
4.8	59.09    25.00		4.8	49.32    23.33		4.8	20.00    35.65		4.8	49.76    11.33		4.8	44.41    56.48	
5.8	59.31    24.97		5.8	49.45    23.22		5.8	20.45    35.42		5.8	49.93    11.09		5.8	44.73    56.34	
6.8	59.51    24.93		6.8	49.56    23.11		6.8	20.93    35.20		6.8	50.12    10.84		6.8	45.03    56.21	
7.8	59.72    24.89		7.8	49.67    22.99		7.8	21.43    34.99		7.8	50.30    10.61		7.8	45.32    56.07	
8.8	59.93    24.83		8.8	49.77    22.86		8.8	21.95    34.79		8.8	50.50    10.41		8.8	45.61    55.91	
9.8	60.13    24.75		9.8	49.88    22.72		9.8	22.47    34.63		9.8	50.71    10.24		9.8	45.89    55.74	
10.8	60.36    24.67		10.8	50.00    22.56		10.8	22.99    34.48		10.8	50.91    10.09		10.8	46.19    55.56	
11.8	60.58    24.58		11.8	50.13    22.39		11.8	23.49    34.35		11.8	51.10    9.94		11.8	46.50    55.37	
12.8	60.82    24.49		12.8	50.25    22.23		12.8	23.97    34.23		12.8	51.28    9.80		12.8	46.82    55.18	
13.8	61.07    24.43		13.8	50.38    22.08		13.8	24.43    34.11		13.8	51.45    9.67		13.8	47.18    55.00	
14.8	61.32    24.38		14.8	50.50    21.94		14.8	24.88    33.99		14.8	51.63    9.54		14.8	47.54    54.83	
15.8	61.57    24.37		15.8	50.64    21.83		15.8	25.32    33.86		15.8	51.79    9.40		15.8	47.92    54.67	
16.8	61.82    24.35		16.8	50.78    21.73		16.8	25.76    33.73		16.8	51.95    9.24		16.8	48.31    54.52	
17.8	62.08    24.36		17.8	50.92    21.66		17.8	26.20    33.58		17.8	52.12    9.07		17.8	48.70    54.41	
18.7	62.33    24.40		18.8	51.05    21.60		18.8	26.65    33.43		18.8	52.29    8.90		18.8	49.10    54.31	
19.7	62.57    24.44		19.8	51.19    21.57		19.8	27.12    33.27		19.8	52.46    8.72		19.8	49.49    54.22	
20.7	62.80    24.48		20.8	51.32    21.54		20.8	27.61    33.11		20.8	52.65    8.54		20.8	49.86    54.16	
21.7	63.02    24.52		21.8	51.46    21.50		21.8	28.15    32.95		21.8	52.85    8.37		21.8	50.21    54.09	
22.7	63.23    24.56		22.8	51.58    21.46		22.8	28.70    32.81		22.8	53.06    8.21		22.8	50.55    54.01	
23.7	63.45    24.59		23.8	51.70    21.41		23.8	29.27    32.70		23.8	53.28    8.07		23.8	50.88    53.93	
24.7	63.66    24.60		24.8	51.83    21.34		24.8	29.85    32.61		24.8	53.51    7.97		24.8	51.21    53.84	
25.7	63.88    24.60		25.8	51.95    21.26		25.8	30.41    32.55		25.8	53.73    7.88		25.8	51.54    53.72	
26.7	64.11    24.60		26.8	52.07    21.18		26.8	30.94    32.50		26.8	53.93    7.81		26.8	51.90    53.61	
27.7	64.35    24.61		27.8	52.21    21.12		27.8	31.46    32.45		27.8	54.13    7.74		27.8	52.28    53.50	
28.7	64.61    24.65		28.8	52.34    21.07		28.8	31.93    32.39		28.8	54.31    7.67		28.8	52.69    53.40	
29.7	64.86    24.72		29.8	52.49    21.05		29.8	32.40    32.32		29.8	54.49    7.58		29.8	53.10    53.35	
30.7	65.11    24.81		30.8	52.63    21.06		30.8	32.86    32.24		30.8	54.66    7.47		30.8	53.54    53.30	
31.7	65.35    24.94		31.8	52.78    21.10		31.8	33.35    32.13		31.8	54.84    7.35		31.8	53.97    53.30	
11.08	-11.04		6.20	-6.12		20.30	+20.27		7.73	+7.67		18.48	-18.45	
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294		7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292			
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13		-86° 54' 6".70			

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119 Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "	Sept.	h m	° ' "
	8 15	+88 52		9 8	-85 19		9 25	+81 41		9 36	-80 34		10 21	+82 58
0.9	58.38	40.14	0.9	33.91	64.26	0.9	22.89	22.62	0.9	12.54	16.97	0.9	3.10	36.57
1.9	59.13	39.87	1.9	34.00	63.95	1.9	22.95	22.31	1.9	12.57	16.64	1.9	3.13	36.24
2.9	59.85	39.59	2.9	34.12	63.63	2.9	23.00	22.00	2.9	12.62	16.33	2.9	3.15	35.87
3.9	60.56	39.29	3.9	34.25	63.35	3.9	23.05	21.67	3.9	12.67	16.04	3.9	3.16	35.52
4.9	61.30	38.98	4.9	34.39	63.09	4.9	23.11	21.30	4.9	12.73	15.76	4.9	3.17	35.15
5.9	62.11	38.66	5.9	34.53	62.85	5.9	23.18	20.93	5.9	12.78	15.49	5.9	3.19	34.74
6.9	63.01	38.33	6.9	34.65	62.63	6.9	23.26	20.55	6.9	12.84	15.25	6.9	3.23	34.33
7.9	63.97	38.04	7.9	34.77	62.41	7.9	23.36	20.17	7.9	12.89	15.01	7.9	3.28	33.93
8.9	65.00	37.74	8.9	34.87	62.18	8.9	23.45	19.80	8.9	12.94	14.74	8.9	3.35	33.52
9.9	66.06	37.46	9.9	34.98	61.90	9.9	23.56	19.47	9.9	12.99	14.46	9.9	3.43	33.14
10.9	67.13	37.20	10.9	35.09	61.64	10.9	23.67	19.15	10.9	13.03	14.19	10.9	3.52	32.76
11.9	68.16	36.96	11.9	35.19	61.35	11.9	23.78	18.83	11.9	13.08	13.91	11.9	3.60	32.41
12.9	69.18	36.74	12.9	35.32	61.06	12.9	23.88	18.54	12.9	13.12	13.61	12.9	3.68	32.07
13.9	70.15	36.52	13.9	35.46	60.76	13.9	23.98	18.26	13.9	13.18	13.30	13.9	3.75	31.76
14.9	71.08	36.29	14.9	35.61	60.46	14.9	24.07	17.98	14.9	13.23	13.00	14.9	3.81	31.43
15.9	71.99	36.07	15.9	35.78	60.18	15.9	24.16	17.68	15.9	13.31	12.68	15.9	3.87	31.11
16.9	72.87	35.83	16.9	35.96	59.90	16.9	24.24	17.38	16.9	13.39	12.39	16.9	3.93	30.78
17.9	73.75	35.60	17.9	36.14	59.66	17.9	24.33	17.07	17.9	13.47	12.10	17.9	3.98	30.43
18.9	74.66	35.35	18.9	36.34	59.42	18.9	24.41	16.75	18.9	13.55	11.84	18.9	4.04	30.07
19.8	75.60	35.09	19.9	36.54	59.21	19.9	24.50	16.42	19.9	13.64	11.60	19.9	4.10	29.70
20.8	76.61	34.81	20.9	36.73	59.01	20.9	24.60	16.09	20.9	13.72	11.36	20.9	4.17	29.34
21.8	77.70	34.54	21.9	36.91	58.82	21.9	24.71	15.74	21.9	13.81	11.14	21.9	4.25	28.94
22.8	78.85	34.29	22.9	37.08	58.62	22.9	24.84	15.39	22.9	13.90	10.93	22.9	4.35	28.55
23.8	80.07	34.05	23.9	37.25	58.43	23.9	24.98	15.06	23.9	13.98	10.73	23.9	4.46	28.16
24.8	81.34	33.84	24.9	37.41	58.22	24.9	25.12	14.76	24.9	14.05	10.51	24.9	4.58	27.79
25.8	82.59	33.65	25.9	37.57	58.00	25.9	25.26	14.48	25.9	14.12	10.29	25.9	4.71	27.44
26.8	83.82	33.47	26.9	37.73	57.76	26.9	25.40	14.20	26.9	14.20	10.05	26.9	4.84	27.11
27.8	84.96	33.30	27.9	37.91	57.52	27.9	25.54	13.93	27.9	14.27	9.79	27.9	4.95	26.79
28.8	86.05	33.14	28.9	38.11	57.29	28.9	25.65	13.67	28.9	14.36	9.52	28.9	5.05	26.49
29.8	87.07	32.96	29.9	38.34	57.08	29.9	25.75	13.41	29.9	14.46	9.28	29.9	5.15	26.18
30.8	88.08	32.77	30.9	38.57	56.89	30.9	25.86	13.14	30.9	14.57	9.04	30.9	5.23	25.86
31.8	89.09	32.55	31.9	38.81	56.70	31.9	25.97	12.86	31.9	14.68	8.83	31.9	5.31	25.52
51.01	+51.00		12.29	-12.25		6.02	+6.84		6.10	-6.02		8.18	+8.12	
8 <sup>h</sup> 15 <sup>m</sup>	48°.380		9 <sup>h</sup> 8 <sup>m</sup>	57°.938		9 <sup>h</sup> 25 <sup>m</sup>	21°.719		9 <sup>h</sup> 36 <sup>m</sup>	22°.347		10 <sup>h</sup> 21 <sup>m</sup>	4°.831	
+88° 53'	0''.29		-85° 19'	57''.45		+81° 41'	41''.50		-80° 34'	6''.83		+82° 58'	54''.07	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

77 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			z Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m	° '	Sept.	h m	° '	Sept.	h m	° '	Sept.	h m	° '	Sept.	h m	° '
	10 59	-84 9		12 13	+88 9		12 45	-84 40		12 48	+83 51		13 27	-85 22
	s	"		s	"		s	"		s	"		s	"
1.0	41.50	11.79	1.1	57.27	24.27	1.1	60.75	52.79	1.1	22.26	41.73	1.1	11.49	14.66
2.0	41.46	11.46	2.1	57.04	23.94	2.1	60.61	52.51	2.1	22.16	41.44	2.1	11.30	14.42
3.0	41.46	11.12	3.1	56.75	23.63	3.1	60.50	52.22	3.1	22.03	41.14	3.1	11.13	14.14
4.0	41.48	10.80	4.1	56.42	23.29	4.1	60.41	51.93	4.1	21.91	40.83	4.1	10.98	13.87
5.0	41.49	10.50	5.1	56.09	22.94	5.1	60.34	51.65	5.1	21.79	40.51	5.1	10.85	13.63
5.9	41.51	10.21	6.1	55.76	22.57	6.1	60.28	51.39	6.1	21.67	40.17	6.1	10.75	13.40
6.9	41.54	9.93	7.0	55.47	22.18	7.1	60.21	51.14	7.1	21.56	39.81	7.1	10.64	13.17
7.9	41.56	9.66	8.0	55.23	21.78	8.1	60.13	50.90	8.1	21.45	39.43	8.1	10.51	12.94
8.9	41.56	9.38	9.0	55.03	21.37	9.1	60.05	50.67	9.1	21.36	39.05	9.1	10.38	12.72
9.9	41.56	9.10	10.0	54.89	20.97	10.1	59.96	50.42	10.1	21.28	38.66	10.1	10.24	12.51
10.9	41.56	8.82	11.0	54.77	20.58	11.1	59.86	50.15	11.1	21.22	38.29	11.1	10.09	12.29
11.9	41.56	8.51	12.0	54.68	20.21	12.1	59.76	49.88	12.1	21.17	37.93	12.1	9.93	12.04
12.9	41.55	8.17	13.0	54.60	19.85	13.1	59.65	49.59	13.1	21.11	37.59	13.1	9.77	11.78
13.9	41.55	7.84	14.0	54.51	19.49	14.1	59.55	49.27	14.1	21.05	37.25	14.1	9.61	11.50
14.9	41.58	7.49	15.0	54.41	19.15	15.0	59.46	48.96	15.0	20.99	36.91	15.1	9.46	11.21
15.9	41.62	7.15	16.0	54.28	18.81	16.0	59.38	48.64	16.0	20.92	36.58	16.1	9.32	10.91
16.9	41.66	6.82	17.0	54.13	18.47	17.0	59.32	48.29	17.0	20.84	36.27	17.1	9.21	10.59
17.9	41.71	6.49	18.0	53.97	18.11	18.0	59.28	47.95	18.0	20.75	35.95	18.1	9.10	10.27
18.9	41.78	6.17	19.0	53.79	17.74	19.0	59.25	47.62	19.0	20.67	35.61	19.1	9.00	9.96
19.9	41.86	5.87	20.0	53.61	17.37	20.0	59.23	47.30	20.0	20.59	35.24	20.1	8.94	9.67
20.9	41.94	5.59	21.0	53.46	16.98	21.0	59.21	47.01	21.0	20.51	34.86	21.1	8.88	9.37
21.9	42.00	5.31	22.0	53.33	16.57	22.0	59.20	46.73	22.0	20.45	34.47	22.1	8.83	9.09
22.9	42.07	5.06	23.0	53.25	16.16	23.0	59.19	46.46	23.0	20.39	34.07	23.1	8.77	8.85
23.9	42.14	4.81	24.0	53.22	15.72	24.0	59.15	46.21	24.0	20.35	33.65	24.1	8.69	8.61
24.9	42.19	4.54	24.9	53.25	15.28	25.0	59.11	45.95	25.0	20.32	33.23	25.0	8.60	8.37
25.9	42.23	4.26	25.9	53.29	14.87	26.0	59.07	45.67	26.0	20.31	32.82	26.0	8.51	8.10
26.9	42.28	3.98	26.9	53.38	14.49	27.0	59.02	45.34	27.0	20.30	32.44	27.0	8.41	7.82
27.9	42.34	3.65	27.9	53.44	14.12	28.0	58.97	45.03	28.0	20.29	32.07	28.0	8.31	7.50
28.9	42.41	3.33	28.9	53.49	13.75	29.0	58.94	44.70	29.0	20.26	31.71	29.0	8.21	7.17
29.9	42.50	3.01	29.9	53.48	13.42	30.0	58.93	44.35	30.0	20.23	31.37	30.0	8.16	6.83
30.9	42.60	2.69	30.9	53.44	13.06	31.0	58.94	43.99	31.0	20.19	31.02	31.0	8.12	6.47
31.9	42.74	2.41	31.9	53.39	12.70	32.0	58.97	43.65	32.0	20.14	30.66	32.0	8.11	6.12
9.81	-9.76		31.06	+31.05		10.79	-10.74		9.35	+9.30		12.39	-12.35	
10 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> .280			12 <sup>h</sup> 14 <sup>m</sup> 28 <sup>s</sup> .425			12 <sup>h</sup> 46 <sup>m</sup> 7 <sup>s</sup> .152			12 <sup>h</sup> 48 <sup>m</sup> 30 <sup>s</sup> .418			13 <sup>h</sup> 27 <sup>m</sup> 14 <sup>s</sup> .624		
-84° 8' 50".60			+88° 9' 36".08			-84° 40' 22".34			+83° 51' 50".47			-85° 21' 42".23		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2333. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.	Wash. Mean Time.	Right Ascen- sion.	Declin- ation.
h m	s	° ' "	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "
Sept. 14 13		-83 17	Sept. 15 2		+87 33	Sept. 15 24		-84 11	Sept. 16 54		+82 10	Sept. 17 16		-80 47
1.1	30.43	53.95	1.2	72.52	13.00	1.2	6.02	62.01	1.3	20.37	45.00	1.3	7.80	29.39
2.1	30.28	53.73	2.2	72.05	12.86	2.2	5.83	61.91	2.3	20.20	45.03	2.3	7.67	29.44
3.1	30.14	53.51	3.2	71.54	12.71	3.2	5.62	61.77	3.3	20.03	45.05	3.3	7.53	29.45
4.1	30.01	53.29	4.2	71.01	12.58	4.2	5.43	61.63	4.3	19.85	45.08	4.3	7.40	29.45
5.1	29.89	53.08	5.2	70.45	12.41	5.2	5.27	61.48	5.2	19.67	45.12	5.3	7.28	29.44
6.1	29.79	52.87	6.2	69.88	12.25	6.2	5.12	61.33	6.2	19.47	45.15	6.3	7.17	29.43
7.1	29.69	52.68	7.2	69.31	12.06	7.2	4.97	61.22	7.2	19.29	45.15	7.3	7.07	29.44
8.1	29.60	52.50	8.2	68.76	11.85	8.2	4.82	61.11	8.2	19.09	45.12	8.3	6.97	29.45
9.1	29.48	52.32	9.2	68.23	11.61	9.2	4.67	61.01	9.2	18.90	45.08	9.3	6.86	29.48
10.1	29.36	52.14	10.2	67.72	11.35	10.2	4.50	60.91	10.2	18.70	45.03	10.2	6.76	29.52
11.1	29.24	51.96	11.2	67.26	11.09	11.2	4.32	60.81	11.2	18.52	44.94	11.2	6.64	29.55
12.1	29.10	51.78	12.2	66.81	10.85	12.2	4.14	60.68	12.2	18.35	44.87	12.2	6.51	29.58
13.1	28.97	51.56	13.1	66.39	10.62	13.2	3.94	60.55	13.2	18.18	44.79	13.2	6.38	29.60
14.1	28.82	51.33	14.1	65.97	10.39	14.2	3.75	60.40	14.2	18.01	44.72	14.2	6.24	29.61
15.1	28.68	51.08	15.1	65.54	10.16	15.2	3.55	60.23	15.2	17.84	44.66	15.2	6.10	29.60
16.1	28.56	50.82	16.1	65.11	9.94	16.2	3.35	60.06	16.2	17.68	44.60	16.2	5.96	29.58
17.1	28.45	50.54	17.1	64.66	9.75	17.2	3.17	59.85	17.2	17.51	44.55	17.2	5.82	29.53
18.1	28.35	50.25	18.1	64.21	9.53	18.1	3.00	59.63	18.2	17.33	44.50	18.2	5.68	29.45
19.1	28.25	49.95	19.1	63.73	9.32	19.1	2.85	59.41	19.2	17.15	44.46	19.2	5.54	29.37
20.1	28.17	49.67	20.1	63.23	9.10	20.1	2.70	59.19	20.2	16.98	44.42	20.2	5.42	29.28
21.1	28.09	49.42	21.1	62.73	8.88	21.1	2.56	58.97	21.2	16.79	44.37	21.2	5.32	29.20
22.1	28.04	49.16	22.1	62.24	8.61	22.1	2.44	58.78	22.2	16.60	44.29	22.2	5.22	29.12
23.1	27.96	48.94	23.1	61.76	8.31	23.1	2.32	58.60	23.2	16.41	44.17	23.2	5.12	29.05
24.1	27.88	48.72	24.1	61.30	8.00	24.1	2.19	58.44	24.2	16.22	44.03	24.2	5.02	29.00
25.1	27.81	48.51	25.1	60.88	7.69	25.1	2.05	58.27	25.2	16.04	43.88	25.2	4.92	28.97
26.1	27.72	48.27	26.1	60.49	7.38	26.1	1.91	58.11	26.2	15.87	43.72	26.2	4.80	28.94
27.1	27.62	48.03	27.1	60.12	7.07	27.1	1.74	57.92	27.2	15.69	43.57	27.2	4.67	28.90
28.1	27.52	47.75	28.1	59.77	6.79	28.1	1.57	57.71	28.2	15.52	43.41	28.2	4.54	28.84
29.1	27.41	47.42	29.1	59.42	6.51	29.1	1.40	57.49	29.2	15.38	43.27	29.2	4.40	28.75
30.1	27.33	47.12	30.1	59.05	6.28	30.1	1.26	57.23	30.2	15.21	43.16	30.2	4.27	28.63
31.1	27.27	46.80	31.1	58.66	6.01	31.1	1.12	56.95	31.2	15.05	43.06	31.2	4.14	28.48
32.1	27.22	46.47	32.1	58.24	5.76	32.1	1.01	56.67	32.2	14.88	42.96	32.2	4.02	28.31
8.57	-8.51		23.42	+23.40		9.90	-9.85		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21".03			+87° 33' 10".52			-84° 11' 30".39			+82° 10' 32".75			-80° 47' 6".56		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursæ Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursæ Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m	° '	Sept.	h m	° '	Sept.	h m	° '	Sept.	h m	° '	Sept.	h m	° '
	17 58	+86 37		18 6	-87 40		19 1	+89 18		19 29	-89 13		20 48	+82 13
	s	"		s	"		s	"		s	"		s	"
1.3	49.56	7.31	1.3	61.45	10.06	1.3	69.78	21.02	1.4	88.60	35.77	1.4	44.12	51.37
2.3	49.19	7.41	2.3	60.94	10.18	2.3	68.65	21.20	2.4	87.38	36.01	2.4	44.04	51.68
3.3	48.82	7.53	3.3	60.42	10.28	3.3	67.52	21.42	3.4	86.11	36.20	3.4	43.95	52.00
4.3	48.42	7.67	4.3	59.94	10.35	4.3	66.36	21.64	4.4	84.83	36.39	4.4	43.88	52.33
5.3	48.01	7.80	5.3	59.46	10.40	5.3	65.12	21.88	5.4	83.61	36.54	5.4	43.79	52.69
6.3	47.59	7.94	6.3	59.02	10.46	6.3	63.82	22.13	6.4	82.46	36.70	6.4	43.70	53.06
7.3	47.13	8.06	7.3	58.60	10.52	7.3	62.43	22.37	7.3	81.38	36.85	7.4	43.61	53.42
8.3	46.68	8.16	8.3	58.19	10.60	8.3	60.99	22.56	8.3	80.36	37.01	8.4	43.50	53.77
9.3	46.23	8.22	9.3	57.78	10.69	9.3	59.52	22.73	9.3	79.33	37.19	9.4	43.39	54.10
10.3	45.78	8.27	10.3	57.36	10.79	10.3	58.05	22.88	10.3	78.29	37.38	10.4	43.26	54.39
11.3	45.35	8.30	11.3	56.90	10.90	11.3	56.62	23.01	11.3	77.16	37.59	11.4	43.13	54.67
12.3	44.93	8.35	12.3	56.40	11.01	12.3	55.22	23.11	12.3	75.97	37.80	12.4	43.01	54.95
13.3	44.51	8.38	13.3	55.90	11.12	13.3	53.87	23.23	13.3	74.68	38.01	13.4	42.88	55.22
14.3	44.12	8.40	14.3	55.36	11.21	14.3	52.56	23.35	14.3	73.30	38.21	14.4	42.78	55.48
15.3	43.73	8.43	15.3	54.81	11.26	15.3	51.28	23.48	15.3	71.85	38.38	15.4	42.66	55.74
16.3	43.34	8.47	16.3	54.24	11.30	16.3	50.01	23.61	16.3	70.35	38.53	16.4	42.55	56.01
17.3	42.93	8.50	17.3	53.68	11.32	17.3	48.76	23.76	17.3	68.80	38.66	17.4	42.44	56.27
18.3	42.53	8.56	18.3	53.13	11.33	18.3	47.48	23.92	18.3	67.25	38.78	18.4	42.32	56.55
19.3	42.12	8.62	19.3	52.60	11.33	19.3	46.15	24.09	19.3	65.73	38.90	19.4	42.22	56.83
20.3	41.69	8.69	20.3	52.09	11.31	20.3	44.78	24.26	20.3	64.27	38.99	20.4	42.09	57.15
21.2	41.24	8.76	21.3	51.61	11.29	21.3	43.32	24.41	21.3	62.89	39.06	21.4	41.97	57.46
22.2	40.78	8.79	22.3	51.17	11.27	22.3	41.79	24.55	22.3	61.58	39.14	22.4	41.84	57.76
23.2	40.31	8.80	23.2	50.74	11.27	23.3	40.21	24.68	23.3	60.33	39.24	23.4	41.70	58.05
24.2	39.85	8.77	24.2	50.31	11.29	24.3	38.59	24.78	24.3	59.12	39.35	24.4	41.55	58.32
25.2	39.37	8.74	25.2	49.87	11.30	25.3	36.98	24.84	25.3	57.89	39.47	25.4	41.40	58.56
26.2	38.93	8.68	26.2	49.37	11.34	26.3	35.42	24.90	26.3	56.58	39.61	26.4	41.24	58.80
27.2	38.50	8.64	27.2	48.87	11.36	27.3	33.93	24.94	27.3	55.17	39.75	27.4	41.09	59.00
28.2	38.09	8.58	28.2	48.32	11.37	28.3	32.51	24.98	28.3	53.62	39.89	28.3	40.94	59.21
29.2	37.71	8.53	29.2	47.76	11.34	29.3	31.14	25.04	29.3	51.99	39.99	29.3	40.80	59.40
30.2	37.30	8.51	30.2	47.19	11.29	30.3	29.80	25.12	30.3	50.30	40.05	30.3	40.67	59.64
31.2	36.90	8.51	31.2	46.63	11.22	31.3	28.46	25.23	31.3	48.60	40.11	31.3	40.54	59.88
32.2	36.49	8.52	32.2	46.11	11.13	32.3	27.06	25.34	32.3	46.95	40.13	32.3	40.42	60.14
16.96	+16.93		24.59	-24.57		58.66	+58.65		74.15	-74.15		7.40	+7.33	
17 <sup>h</sup> 59 <sup>m</sup>	1 <sup>s</sup> .307		18 <sup>h</sup> 6 <sup>m</sup> 11 <sup>s</sup> .893			19 <sup>h</sup> 2 <sup>m</sup> 39 <sup>s</sup> .624			19 <sup>h</sup> 27 <sup>m</sup> 42 <sup>s</sup> .218			20 <sup>h</sup> 48 <sup>m</sup> 40 <sup>s</sup> .494		
+86° 36' 51".17			-87° 39' 51".82			+89° 1' 2".17			-89° 13' 28".57			+82° 13' 29".86		



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Sept.	h m 21 38	° ' -83 58	Sept.	h m 22 16	° ' -86 23	Sept.	h m 22 37	° ' -81 48	Sept.	h m 23 28	° ' +86 51	Sept.	h m 23 47	° ' -82 28
	s "	"		s "	"		s "	"		s "	"		s "	"
1.5	40.33	54.55	1.5	43.00	10.03	1.5	55.14	42.02	1.5	4.04	14.66	1.5	30.14	20.81
2.5	40.29	54.87	2.5	42.97	10.36	2.5	55.14	42.35	2.5	4.12	14.99	2.5	30.20	21.12
3.5	40.23	55.17	3.5	42.91	10.68	3.5	55.14	42.66	3.5	4.22	15.35	3.5	30.23	21.42
4.4	40.16	55.44	4.5	42.82	10.97	4.5	55.12	42.95	4.5	4.33	15.71	4.5	30.26	21.72
5.4	40.10	55.70	5.5	42.73	11.25	5.5	55.10	43.23	5.5	4.43	16.09	5.5	30.29	22.01
6.4	40.05	55.94	6.5	42.67	11.52	6.5	55.08	43.48	6.5	4.53	16.51	6.5	30.32	22.28
7.4	40.00	56.17	7.5	42.61	11.76	7.5	55.07	43.75	7.5	4.62	16.91	7.5	30.35	22.55
8.4	39.96	56.41	8.5	42.57	12.03	8.5	55.08	44.01	8.5	4.66	17.33	8.5	30.39	22.80
9.4	39.93	56.68	9.5	42.54	12.30	9.5	55.08	44.28	9.5	4.67	17.74	9.5	30.44	23.06
10.4	39.89	56.95	10.5	42.52	12.59	10.5	55.09	44.56	10.5	4.68	18.14	10.5	30.48	23.33
11.4	39.85	57.23	11.5	42.49	12.89	11.5	55.09	44.86	11.5	4.65	18.53	11.5	30.53	23.61
12.4	39.80	57.54	12.5	42.44	13.21	12.5	55.08	45.17	12.5	4.62	18.91	12.5	30.58	23.91
13.4	39.75	57.85	13.4	42.39	13.53	13.5	55.07	45.49	13.5	4.59	19.28	13.5	30.61	24.22
14.4	39.67	58.17	14.4	42.30	13.86	14.5	55.05	45.82	14.5	4.56	19.63	14.5	30.64	24.55
15.4	39.58	58.48	15.4	42.20	14.19	15.5	55.01	46.15	15.5	4.55	19.99	15.5	30.65	24.88
16.4	39.49	58.77	16.4	42.07	14.52	16.5	54.97	46.48	16.5	4.54	20.32	16.5	30.67	25.24
17.4	39.39	59.06	17.4	41.92	14.82	17.5	54.92	46.80	17.5	4.55	20.67	17.5	30.67	25.58
18.4	39.28	59.32	18.4	41.75	15.12	18.5	54.87	47.10	18.5	4.56	21.03	18.5	30.66	25.92
19.4	39.17	59.57	19.4	41.59	15.39	19.4	54.81	47.39	19.5	4.57	21.42	19.5	30.64	26.24
20.4	39.06	59.81	20.4	41.42	15.67	20.4	54.75	47.67	20.5	4.59	21.82	20.5	30.63	26.54
21.4	38.96	60.01	21.4	41.27	15.91	21.4	54.70	47.93	21.5	4.59	22.23	21.5	30.61	26.83
22.4	38.87	60.22	22.4	41.13	16.15	22.4	54.65	48.17	22.5	4.56	22.65	22.5	30.59	27.11
23.4	38.80	60.44	23.4	41.01	16.40	23.4	54.61	48.41	23.5	4.52	23.08	23.5	30.59	27.38
24.4	38.72	60.67	24.4	40.91	16.64	24.4	54.59	48.67	24.5	4.44	23.50	24.5	30.60	27.64
25.4	38.65	60.91	25.4	40.80	16.90	25.4	54.56	48.94	25.5	4.33	23.91	25.5	30.61	27.92
26.4	38.56	61.17	26.4	40.70	17.18	26.4	54.52	49.22	26.5	4.20	24.31	26.5	30.63	28.22
27.4	38.47	61.43	27.4	40.56	17.49	27.4	54.48	49.53	27.5	4.08	24.67	27.5	30.63	28.53
28.4	38.37	61.69	28.4	40.40	17.78	28.4	54.43	49.83	28.5	3.97	25.03	28.5	30.62	28.86
29.4	38.24	61.95	29.4	40.21	18.07	29.4	54.35	50.15	29.5	3.87	25.37	29.5	30.58	29.21
30.4	38.10	62.19	30.4	40.00	18.35	30.4	54.27	50.44	30.5	3.80	25.71	30.5	30.54	29.54
31.4	37.96	62.42	31.4	39.75	18.60	31.4	54.18	50.72	31.4	3.74	26.06	31.5	30.49	29.87
32.4	37.82	62.62	32.4	39.51	18.83	32.4	54.09	50.97	32.4	3.69	26.44	32.5	30.43	30.19
8.32	-8.26		15.87	-15.84		7.02	-6.95		18.23	+18.20		7.63	-7.57	
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".42		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Oct.	h m    ° ' "		Oct.	h m    ° ' "		Oct.	h m    ° ' "		Oct.	h m    ° ' "		Oct.	h m    ° ' "	
	0 57 +85 49			1 31 +88 51			1 42 -85 10			4 10 +85 20			5 35 +85 9	
	s        "			s        "			s        "			s        "			s        "	
0.5	33.17	5.18	0.5	40.77	59.54	0.5	13.73	54.95	0.6	29.93	7.21	0.7	36.57	16.72
1.5	33.26	5.54	1.5	41.26	59.86	1.5	13.78	55.29	1.6	30.19	7.37	1.7	36.85	16.75
2.5	33.36	5.91	2.5	41.80	60.19	2.5	13.81	55.63	2.6	30.48	7.54	2.7	37.17	16.78
3.5	33.46	6.29	3.5	42.34	60.57	3.5	13.84	55.95	3.6	30.79	7.72	3.7	37.48	16.82
4.5	33.55	6.68	4.5	42.86	60.95	4.5	13.87	56.24	4.6	31.10	7.92	4.7	37.82	16.88
5.5	33.63	7.10	5.5	43.31	61.36	5.5	13.90	56.53	5.6	31.39	8.14	5.7	38.16	16.95
6.5	33.68	7.51	6.5	43.68	61.76	6.5	13.94	56.81	6.6	31.69	8.38	6.7	38.50	17.05
7.5	33.71	7.92	7.5	43.98	62.17	7.5	13.98	57.09	7.6	31.97	8.64	7.7	38.82	17.19
8.5	33.72	8.33	8.5	44.20	62.58	8.5	14.04	57.38	8.6	32.22	8.90	8.7	39.13	17.33
9.5	33.72	8.73	9.5	44.37	62.96	9.5	14.11	57.69	9.6	32.46	9.17	9.7	39.42	17.48
10.5	33.71	9.11	10.5	44.50	63.34	10.5	14.17	58.01	10.6	32.69	9.42	10.7	39.70	17.62
11.5	33.70	9.48	11.5	44.64	63.72	11.5	14.21	58.33	11.6	32.90	9.67	11.7	39.97	17.76
12.5	33.69	9.81	12.5	44.77	64.06	12.5	14.25	58.67	12.6	33.10	9.91	12.7	40.24	17.89
13.5	33.69	10.16	13.5	44.94	64.40	13.5	14.26	59.03	13.6	33.33	10.15	13.7	40.48	18.02
14.5	33.70	10.51	14.5	45.13	64.75	14.5	14.27	59.40	14.6	33.54	10.39	14.7	40.75	18.14
15.5	33.71	10.85	15.5	45.35	65.09	15.5	14.26	59.76	15.6	33.76	10.62	15.7	41.01	18.25
16.5	33.73	11.19	16.5	45.61	65.44	16.5	14.23	60.10	16.6	34.00	10.84	16.7	41.29	18.34
17.5	33.75	11.56	17.5	45.88	65.80	17.5	14.20	60.45	17.6	34.24	11.05	17.7	41.57	18.43
18.5	33.78	11.95	18.5	46.14	66.18	18.5	14.17	60.78	18.6	34.51	11.29	18.7	41.88	18.53
19.5	33.80	12.36	19.5	46.38	66.60	19.5	14.12	61.09	19.6	34.77	11.55	19.7	42.19	18.67
20.5	33.80	12.78	20.5	46.56	67.01	20.5	14.09	61.37	20.6	35.04	11.82	20.7	42.51	18.82
21.5	33.78	13.19	21.5	46.67	67.43	21.5	14.06	61.66	21.6	35.28	12.13	21.7	42.83	19.00
22.5	33.74	13.61	22.5	46.68	67.84	22.5	14.05	61.93	22.6	35.50	12.45	22.6	43.12	19.19
23.5	33.67	14.00	23.5	46.60	68.26	23.5	14.05	62.20	23.6	35.71	12.76	23.6	43.41	19.42
24.4	33.59	14.37	24.5	46.48	68.64	24.5	14.04	62.51	24.6	35.90	13.08	24.6	43.66	19.64
25.4	33.51	14.72	25.5	46.35	69.02	25.5	14.02	62.84	25.6	36.08	13.39	25.6	43.91	19.84
26.4	33.44	15.05	26.5	46.25	69.36	26.5	13.99	63.18	26.6	36.24	13.68	26.6	44.14	20.03
27.4	33.38	15.38	27.5	46.19	69.70	27.5	13.94	63.53	27.6	36.41	13.94	27.6	44.38	20.19
28.4	33.33	15.71	28.5	46.22	70.04	28.5	13.86	63.88	28.6	36.59	14.19	28.6	44.61	20.34
29.4	33.30	16.05	29.5	46.27	70.38	29.5	13.76	64.23	29.6	36.79	14.43	29.6	44.87	20.49
30.4	33.29	16.40	30.5	46.36	70.75	30.5	13.66	64.56	30.6	37.01	14.70	30.6	45.14	20.64
31.4	33.26	16.78	31.5	46.43	71.13	31.5	13.56	64.88	31.6	37.24	14.98	31.6	45.42	20.82
13.72	+13.68		50.62	+50.61		11.91	-11.87		12.30	+12.26		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9'		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			C Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 5 46 s	° ' -84 49 "	Oct.	h m 6 46 s	° ' -80 43 "	Oct.	h m 7 2 s	° ' +87 10 "	Oct.	h m 7 13 s	° ' +82 34 "	Oct.	h m 7 15 s	° ' -86 53 "
0.7	5.11	24.81	0.8	52.63	21.06	0.8	32.86	32.24	0.8	54.66	7.47	0.8	53.54	53.30
1.7	5.35	24.94	1.8	52.78	21.10	1.8	33.35	32.13	1.8	54.84	7.35	1.8	53.97	53.30
2.7	5.58	25.07	2.8	52.92	21.15	2.8	33.85	32.01	2.8	55.03	7.22	2.8	54.37	53.30
3.7	5.80	25.21	3.7	53.06	21.21	3.8	34.38	31.90	3.8	55.23	7.10	3.8	54.76	53.31
4.7	6.00	25.31	4.7	53.19	21.26	4.8	34.93	31.79	4.8	55.45	6.98	4.8	55.13	53.33
5.7	6.21	25.43	5.7	53.31	21.30	5.8	35.51	31.72	5.8	55.68	6.88	5.8	55.50	53.34
6.7	6.41	25.53	6.7	53.45	21.33	6.8	36.09	31.67	6.8	55.91	6.81	6.8	55.85	53.33
7.7	6.62	25.62	7.7	53.58	21.35	7.7	36.67	31.64	7.8	56.13	6.76	7.8	56.21	53.31
8.7	6.84	25.70	8.7	53.70	21.36	8.7	37.22	31.63	8.8	56.34	6.71	8.8	56.57	53.27
9.7	7.06	25.79	9.7	53.84	21.38	9.7	37.75	31.63	9.8	56.55	6.70	9.8	56.96	53.23
10.7	7.29	25.92	10.7	53.98	21.41	10.7	38.26	31.64	10.7	56.75	6.69	10.7	57.36	53.21
11.7	7.53	26.04	11.7	54.11	21.44	11.7	38.76	31.65	11.7	56.94	6.67	11.7	57.78	53.20
12.7	7.77	26.17	12.7	54.26	21.49	12.7	39.25	31.65	12.7	57.13	6.64	12.7	58.21	53.19
13.7	8.00	26.31	13.7	54.40	21.56	13.7	39.72	31.64	13.7	57.30	6.61	13.7	58.64	53.23
14.7	8.23	26.48	14.7	54.55	21.64	14.7	40.18	31.62	14.7	57.49	6.58	14.7	59.08	53.27
15.7	8.46	26.68	15.7	54.69	21.75	15.7	40.66	31.60	15.7	57.67	6.54	15.7	59.51	53.33
16.7	8.68	26.89	16.7	54.83	21.88	16.7	41.15	31.57	16.7	57.85	6.49	16.7	59.93	53.41
17.7	8.88	27.10	17.7	54.97	22.02	17.7	41.66	31.53	17.7	58.05	6.43	17.7	60.35	53.51
18.7	9.08	27.31	18.7	55.10	22.17	18.7	42.20	31.51	18.7	58.27	6.37	18.7	60.73	53.61
19.7	9.26	27.50	19.7	55.22	22.31	19.7	42.76	31.50	19.7	58.49	6.34	19.7	61.10	53.72
20.7	9.44	27.70	20.7	55.35	22.44	20.7	43.35	31.50	20.7	58.71	6.32	20.7	61.46	53.80
21.7	9.61	27.88	21.7	55.47	22.56	21.7	43.93	31.53	21.7	58.94	6.31	21.7	61.80	53.88
22.7	9.79	28.03	22.7	55.59	22.66	22.7	44.50	31.58	22.7	59.18	6.34	22.7	62.13	53.94
23.7	9.98	28.19	23.7	55.71	22.76	23.7	45.05	31.66	23.7	59.39	6.38	23.7	62.50	53.99
24.6	10.17	28.36	24.7	55.84	22.85	24.7	45.57	31.75	24.7	59.59	6.43	24.7	62.87	54.05
25.6	10.37	28.55	25.7	55.96	22.97	25.7	46.06	31.83	25.7	59.78	6.49	25.7	63.27	54.13
26.6	10.57	28.77	26.7	56.10	23.11	26.7	46.53	31.90	26.7	59.97	6.53	26.7	63.68	54.21
27.6	10.77	29.00	27.7	56.23	23.28	27.7	46.99	31.95	27.7	60.14	6.56	27.7	64.11	54.33
28.6	10.97	29.26	28.7	56.37	23.48	28.7	47.44	31.99	28.7	60.32	6.57	28.7	64.53	54.50
29.6	11.15	29.55	29.7	56.50	23.70	29.7	47.92	32.01	29.7	60.51	6.57	29.7	64.92	54.68
30.6	11.31	29.84	30.7	56.62	23.93	30.7	48.43	32.02	30.7	60.70	6.57	30.7	65.30	54.86
31.6	11.46	30.12	31.7	56.73	24.15	31.7	48.96	32.05	31.7	60.91	6.58	31.7	65.65	55.04
11.08	-11.04		6.20	-6.12		20.29	+20.27		7.73	+7.67		18.48	-18.45	
5 <sup>h</sup> 46 <sup>m</sup> 14 <sup>s</sup> .756			6 <sup>h</sup> 46 <sup>m</sup> 58 <sup>s</sup> .546			7 <sup>h</sup> 2 <sup>m</sup> 4 <sup>s</sup> .048			7 <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> .294			7 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .292		
-84° 49' 46".89			-80° 43' 38".16			+87° 10' 54".74			+82° 34' 30".13			-86° 54' 6".70		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 8 16	° ' +88 52	Oct.	h m 9 8	° ' -85 19	Oct.	h m 9 25	° ' +81 41	Oct.	h m 9 36	° ' -80 34	Oct.	h m 10 21	° ' +82 58
	s "	"		s "	"		s "	"		s "	"		s "	"
0.8	28.08	32.77	0.9	38.57	56.89	0.9	25.86	13.14	0.9	14.57	9.04	0.9	5.23	25.86
1.8	29.09	32.55	1.9	38.81	56.70	1.9	25.97	12.86	1.9	14.68	8.83	1.9	5.31	25.52
2.8	30.15	32.33	2.8	39.06	56.56	2.9	26.08	12.55	2.9	14.80	8.64	2.9	5.40	25.16
3.8	31.30	32.10	3.8	39.30	56.43	3.9	26.20	12.22	3.9	14.91	8.49	3.9	5.49	24.80
4.8	32.52	31.88	4.8	39.53	56.31	4.9	26.34	11.91	4.9	15.02	8.35	4.9	5.62	24.43
5.8	33.80	31.68	5.8	39.74	56.18	5.9	26.49	11.62	5.9	15.13	8.19	5.9	5.75	24.06
6.8	35.11	31.50	6.8	39.95	56.05	6.9	26.64	11.33	6.9	15.23	8.02	6.9	5.89	23.72
7.8	36.44	31.35	7.8	40.16	55.90	7.8	26.81	11.07	7.9	15.33	7.85	7.9	6.03	23.38
8.8	37.75	31.21	8.8	40.36	55.72	8.8	26.96	10.83	8.9	15.43	7.67	8.9	6.18	23.07
9.8	39.02	31.09	9.8	40.58	55.55	9.8	27.12	10.59	9.9	15.53	7.48	9.9	6.32	22.77
10.8	40.24	30.99	10.8	40.80	55.39	10.8	27.26	10.37	10.8	15.64	7.29	10.9	6.46	22.48
11.8	41.42	30.88	11.8	41.04	55.23	11.8	27.41	10.17	11.8	15.74	7.09	11.9	6.60	22.20
12.8	42.55	30.76	12.8	41.29	55.07	12.8	27.54	9.97	12.8	15.87	6.89	12.9	6.73	21.93
13.8	43.67	30.63	13.8	41.56	54.92	13.8	27.67	9.75	13.8	15.99	6.71	13.9	6.85	21.67
14.8	44.76	30.51	14.8	41.83	54.80	14.8	27.80	9.53	14.8	16.12	6.57	14.9	6.96	21.40
15.8	45.87	30.39	15.8	42.11	54.69	15.8	27.93	9.30	15.8	16.25	6.43	15.9	7.08	21.12
16.8	47.00	30.25	16.8	42.38	54.59	16.8	28.06	9.06	16.8	16.39	6.32	16.9	7.20	20.81
17.8	48.18	30.10	17.8	42.67	54.53	17.8	28.19	8.82	17.8	16.53	6.22	17.9	7.32	20.49
18.8	49.42	29.94	18.8	42.94	54.48	18.8	28.34	8.57	18.8	16.66	6.13	18.9	7.46	20.17
19.8	50.74	29.79	19.8	43.20	54.43	19.8	28.52	8.32	19.8	16.79	6.06	19.9	7.60	19.85
20.8	52.12	29.67	20.8	43.44	54.38	20.8	28.68	8.08	20.8	16.92	5.99	20.8	7.78	19.53
21.8	53.53	29.57	21.8	43.67	54.33	21.8	28.85	7.85	21.8	17.04	5.91	21.8	7.96	19.23
22.8	54.95	29.50	22.8	43.90	54.25	22.8	29.04	7.64	22.8	17.16	5.82	22.8	8.14	18.94
23.8	56.33	29.44	23.8	44.14	54.17	23.8	29.22	7.46	23.8	17.27	5.71	23.8	8.32	18.70
24.8	57.66	29.40	24.8	44.37	54.08	24.8	29.40	7.31	24.8	17.39	5.61	24.8	8.50	18.45
25.8	58.90	29.36	25.8	44.64	53.99	25.8	29.55	7.16	25.8	17.51	5.50	25.8	8.66	18.22
26.7	60.08	29.32	26.8	44.92	53.92	26.8	29.70	7.00	26.8	17.64	5.38	26.8	8.81	18.00
27.7	61.22	29.27	27.8	45.21	53.87	27.8	29.85	6.82	27.8	17.78	5.30	27.8	8.95	17.78
28.7	62.34	29.19	28.8	45.51	53.84	28.8	29.98	6.65	28.8	17.94	5.25	28.8	9.09	17.54
29.7	63.50	29.11	29.8	45.81	53.85	29.8	30.12	6.46	29.8	18.08	5.21	29.8	9.24	17.27
30.7	64.72	29.02	30.8	46.11	53.89	30.8	30.29	6.25	30.8	18.24	5.21	30.8	9.38	16.99
31.7	66.01	28.92	31.8	46.39	53.92	31.8	30.46	6.05	31.8	18.39	5.23	31.8	9.55	16.71
50.94	+50.93		12.29	-12.25		6.91	+6.84		6.10	-6.02		8.17	+8.11	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

77 Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			z Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° '		h m	° '		h m	° '		h m	° '		h m	° '
Oct.	10 59	-84 8	Oct.	12 13	+88 9	Oct.	12 45	-84 40	Oct.	12 48	+83 51	Oct.	13 27	-85 21
	s	"		s	"		s	"		s	"		s	"
0.9	42.60	62.69	0.9	53.44	13.06	1.0	58.94	43.99	1.0	20.19	31.02	1.0	8.12	66.47
1.9	42.74	62.41	1.9	53.39	12.70	2.0	58.97	43.65	2.0	20.14	30.66	2.0	8.11	66.12
2.9	42.87	62.16	2.9	53.32	12.32	2.9	59.01	43.33	3.0	20.09	30.29	3.0	8.10	65.81
3.9	42.99	61.92	3.9	53.27	11.91	3.9	59.07	43.04	3.9	20.05	29.89	4.0	8.11	65.53
4.9	43.12	61.70	4.9	53.28	11.49	4.9	59.12	42.76	4.9	20.01	29.47	5.0	8.12	65.26
5.9	43.23	61.47	5.9	53.33	11.07	5.9	59.15	42.50	5.9	20.00	29.04	6.0	8.13	64.98
6.9	43.33	61.23	6.9	53.43	10.64	6.9	59.17	42.23	6.9	20.00	28.62	7.0	8.12	64.71
7.9	43.44	60.98	7.9	53.58	10.22	7.9	59.19	41.95	7.9	20.01	28.20	8.0	8.09	64.43
8.9	43.54	60.73	8.9	53.76	9.84	8.9	59.29	41.66	8.9	20.02	27.79	9.0	8.05	64.15
9.9	43.63	60.46	9.9	53.94	9.46	9.9	59.21	41.34	9.9	20.06	27.40	10.0	8.02	63.84
10.9	43.74	60.19	10.9	54.13	9.10	10.9	59.23	41.01	10.9	20.09	27.02	11.0	7.99	63.52
11.9	43.86	59.91	11.9	54.31	8.76	11.9	59.26	40.68	11.9	20.10	26.66	12.0	7.97	63.18
12.9	44.00	59.62	12.9	54.46	8.41	12.9	59.29	40.36	12.9	20.11	26.30	13.0	7.96	62.83
13.9	44.14	59.34	13.9	54.61	8.07	13.9	59.34	40.01	13.9	20.12	25.95	13.9	7.97	62.49
14.9	44.29	59.09	14.9	54.72	7.72	14.9	59.41	39.67	14.9	20.13	25.61	14.9	7.99	62.15
15.9	44.46	58.85	15.9	54.82	7.38	15.9	59.50	39.32	15.9	20.13	25.26	15.9	8.03	61.81
16.9	44.63	58.61	16.9	54.92	7.01	16.9	59.59	38.99	16.9	20.13	24.89	16.9	8.09	61.48
17.9	44.80	58.40	17.9	55.03	6.63	17.9	59.69	38.71	17.9	20.14	24.51	17.9	8.17	61.15
18.9	44.98	58.20	18.9	55.16	6.23	18.9	59.80	38.41	18.9	20.15	24.12	18.9	8.25	60.84
19.9	45.16	58.02	19.9	55.34	5.82	19.9	59.91	38.15	19.9	20.17	23.71	19.9	8.33	60.56
20.9	45.31	57.85	20.9	55.56	5.43	20.9	60.01	37.92	20.9	20.21	23.28	20.9	8.40	60.29
21.9	45.46	57.68	21.9	55.84	5.04	21.9	60.10	37.68	21.9	20.27	22.86	21.9	8.46	60.03
22.9	45.60	57.50	22.9	56.17	4.64	22.9	60.18	37.42	22.9	20.33	22.45	22.9	8.51	59.77
23.9	45.74	57.30	23.9	56.50	4.26	23.9	60.25	37.16	23.9	20.41	22.05	23.9	8.54	59.49
24.9	45.89	57.08	24.9	56.86	3.90	24.9	60.33	36.88	24.9	20.49	21.66	24.9	8.58	59.18
25.9	46.04	56.86	25.9	57.19	3.57	25.9	60.41	36.58	25.9	20.55	21.29	25.9	8.63	58.85
26.9	46.22	56.66	26.9	57.48	3.24	26.9	60.50	36.26	26.9	20.60	20.96	26.9	8.70	58.52
27.9	46.41	56.46	27.9	57.72	2.92	27.9	60.63	35.95	27.9	20.65	20.62	27.9	8.79	58.18
28.9	46.62	56.27	28.9	57.95	2.61	28.9	60.76	35.65	28.9	20.69	20.28	28.9	8.91	57.85
29.9	46.82	56.12	29.9	58.15	2.26	29.9	60.93	35.36	29.9	20.73	19.93	29.9	9.04	57.54
30.9	47.05	55.98	30.9	58.38	1.90	30.9	61.10	35.12	30.9	20.77	19.56	30.9	9.18	57.24
31.8	47.26	55.87	31.9	58.63	1.53	31.9	61.27	34.88	31.9	20.82	19.17	31.9	9.34	56.97
9.81	-9.76		31.01	+30.99		10.78	-10.73		9.35	+9.29		12.38	-12.34	
10 <sup>h</sup> 59 <sup>m</sup>	55° 28'		12 <sup>h</sup> 14 <sup>m</sup>	28° 42'		12 <sup>h</sup> 46 <sup>m</sup>	7° 15'		12 <sup>h</sup> 48 <sup>m</sup>	30° 41'		13 <sup>h</sup> 27 <sup>m</sup>	14° 62'	
-84° 8'	50'' 60		+88° 9'	36'' 08		-84° 40'	22'' 34		+83° 51'	50'' 47		-85° 21'	42'' 23	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2288. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 14 13	° ' -83 17	Oct.	h m 15 2	° ' +87 32	Oct.	h m 15 23	° ' -84 11	Oct.	h m 16 54	° ' +82 10	Oct.	h m 17 16	° ' -80 47
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	27.27	46.80	1.1	58.66	66.01	1.1	61.12	56.95	1.2	15.05	43.06	1.2	4.14	28.48
2.1	27.22	46.47	2.1	58.24	65.76	2.1	61.01	56.67	2.2	14.88	42.96	2.2	4.02	28.31
3.1	27.19	46.15	3.1	57.79	65.50	3.1	60.91	56.38	3.2	14.70	42.86	3.2	3.92	28.14
4.1	27.16	45.87	4.1	57.34	65.21	4.1	60.82	56.12	4.2	14.51	42.74	4.2	3.82	28.00
5.1	27.14	45.61	5.1	56.92	64.91	5.1	60.73	55.88	5.2	14.33	42.59	5.2	3.73	27.85
6.1	27.11	45.33	6.1	56.50	64.58	6.1	60.65	55.66	6.2	14.16	42.42	6.2	3.65	27.72
7.0	27.07	45.05	7.1	56.13	64.21	7.1	60.56	55.43	7.2	13.98	42.23	7.2	3.56	27.60
8.0	27.03	44.80	8.1	55.80	63.85	8.1	60.44	55.21	8.2	13.81	42.01	8.2	3.46	27.50
9.0	26.98	44.53	9.1	55.48	63.51	9.1	60.32	54.98	9.2	13.65	41.79	9.2	3.34	27.39
10.0	26.92	44.23	10.1	55.20	63.19	10.1	60.20	54.74	10.2	13.50	41.58	10.2	3.22	27.26
11.0	26.86	43.91	11.1	54.92	62.87	11.1	60.08	54.47	11.1	13.35	41.38	11.2	3.10	27.13
12.0	26.81	43.61	12.1	54.66	62.53	12.1	59.96	54.20	12.1	13.21	41.18	12.2	2.98	26.98
13.0	26.76	43.28	13.1	54.39	62.21	13.1	59.84	53.92	13.1	13.06	40.98	13.2	2.86	26.80
14.0	26.73	42.95	14.1	54.11	61.94	14.1	59.74	53.60	14.1	12.92	40.80	14.2	2.73	26.60
15.0	26.70	42.61	15.1	53.80	61.65	15.1	59.64	53.28	15.1	12.77	40.63	15.2	2.62	26.39
16.0	26.69	42.26	16.1	53.50	61.37	16.1	59.56	52.94	16.1	12.62	40.47	16.2	2.52	26.17
17.0	26.69	41.92	17.1	53.18	61.05	17.1	59.50	52.62	17.1	12.47	40.30	17.1	2.41	25.94
18.0	26.71	41.60	18.1	52.85	60.73	18.1	59.44	52.31	18.1	12.31	40.12	18.1	2.32	25.71
19.0	26.74	41.27	19.1	52.52	60.39	19.1	59.40	52.01	19.1	12.15	39.91	19.1	2.24	25.49
20.0	26.76	41.00	20.0	52.20	60.05	20.1	59.37	51.72	20.1	11.99	39.68	20.1	2.18	25.30
21.0	26.78	40.71	21.0	51.91	59.68	21.1	59.34	51.46	21.1	11.84	39.45	21.1	2.12	25.10
22.0	26.79	40.44	22.0	51.66	59.29	22.1	59.29	51.20	22.1	11.68	39.18	22.1	2.04	24.92
23.0	26.79	40.19	23.0	51.43	58.90	23.1	59.24	50.94	23.1	11.54	38.89	23.1	1.96	24.74
24.0	26.80	39.91	24.0	51.24	58.51	24.1	59.18	50.68	24.1	11.40	38.59	24.1	1.88	24.58
24.9	26.79	39.60	25.0	51.07	58.15	25.0	59.10	50.41	25.1	11.27	38.32	25.1	1.79	24.40
25.9	26.78	39.28	26.0	50.91	57.79	26.0	59.04	50.10	26.1	11.15	38.06	26.1	1.69	24.18
26.9	26.79	38.96	27.0	50.75	57.46	27.0	58.98	49.78	27.1	11.03	37.81	27.1	1.59	23.93
27.9	26.82	38.61	28.0	50.56	57.14	28.0	58.93	49.43	28.1	10.90	37.57	28.1	1.49	23.66
28.9	26.85	38.26	29.0	50.34	56.83	29.0	58.91	49.07	29.1	10.78	37.35	29.1	1.41	23.39
29.9	26.90	37.92	30.0	50.09	56.51	30.0	58.90	48.71	30.1	10.65	37.15	30.1	1.33	23.10
30.9	26.98	37.60	31.0	49.85	56.17	31.0	58.91	48.38	31.1	10.51	36.92	31.1	1.28	22.80
31.9	27.06	37.31	32.0	49.61	55.81	32.0	58.95	48.07	32.1	10.38	36.67	32.1	1.24	22.51
8.57	-8.51		23.40	+23.37		9.89	-9.84		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup>	27°.793		15 <sup>h</sup> 3 <sup>m</sup>	41°.175		15 <sup>h</sup> 23 <sup>m</sup>	56°.594		16 <sup>h</sup> 54 <sup>m</sup>	25°.488		17 <sup>h</sup> 15 <sup>m</sup>	54°.896	
-83° 17'	21''.03		+87° 33'	10''.52		-84° 11'	30''.39		+82° 10'	32''.75		-80° 47'	6''.56	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursæ Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursæ Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 17 58	° ' " +86 37	Oct.	h m 18 6	° ' " -87 40	Oct.	h m 19 0	° ' " +89 1	Oct.	h m 19 29	° ' " -89 13	Oct.	h m 20 48	° ' " +82 13
1.2	36.90	8.51	1.2	46.63	11.22	1.3	88.46	25.23	1.3	48.60	40.11	1.3	40.54	59.88
2.2	36.49	8.52	2.2	46.11	11.13	2.3	87.06	25.34	2.3	46.95	40.13	2.3	40.42	60.14
3.2	36.04	8.52	3.2	45.64	11.03	3.3	85.59	25.45	3.3	45.38	40.14	3.3	40.28	60.41
4.2	35.58	8.50	4.2	45.20	10.94	4.3	84.04	25.56	4.3	43.91	40.14	4.3	40.14	60.67
5.2	35.12	8.47	5.2	44.75	10.84	5.3	82.43	25.63	5.3	42.50	40.14	5.3	39.99	60.93
6.2	34.67	8.42	6.2	44.31	10.76	6.3	80.80	25.69	6.3	41.15	40.18	6.3	39.83	61.16
7.2	34.20	8.32	7.2	43.88	10.69	7.2	79.17	25.73	7.3	39.79	40.23	7.3	39.66	61.36
8.2	33.77	8.22	8.2	43.42	10.63	8.2	77.57	25.73	8.3	38.38	40.27	8.3	39.49	61.55
9.2	33.33	8.11	9.2	42.95	10.58	9.2	76.01	25.72	9.3	36.91	40.32	9.3	39.32	61.74
10.2	32.92	8.01	10.2	42.44	10.50	10.2	74.51	25.72	10.3	35.36	40.36	10.3	39.15	61.90
11.2	32.53	7.90	11.2	41.92	10.42	11.2	73.07	25.70	11.3	33.75	40.41	11.3	39.00	62.05
12.2	32.15	7.79	12.2	41.38	10.34	12.2	71.68	25.69	12.3	32.06	40.42	12.3	38.84	62.20
13.2	31.76	7.69	13.2	40.83	10.24	13.2	70.31	25.70	13.3	30.33	40.43	13.3	38.68	62.34
14.2	31.39	7.60	14.2	40.30	10.10	14.2	68.95	25.71	14.2	28.56	40.41	14.3	38.53	62.49
15.2	31.01	7.53	15.2	39.77	9.95	15.2	67.59	25.71	15.2	26.81	40.38	15.3	38.39	62.67
16.2	30.62	7.45	16.2	39.26	9.78	16.2	66.20	25.74	16.2	25.08	40.35	16.3	38.24	62.85
17.2	30.21	7.38	17.2	38.79	9.60	17.2	64.78	25.77	17.2	23.41	40.27	17.3	38.10	63.02
18.2	29.80	7.30	18.2	38.35	9.41	18.2	63.29	25.80	18.2	21.83	40.19	18.3	37.94	63.20
19.2	29.37	7.20	19.2	37.94	9.23	19.2	61.73	25.81	19.2	20.35	40.09	19.3	37.77	63.38
20.2	28.94	7.07	20.2	37.56	9.08	20.2	60.13	25.81	20.2	18.94	40.03	20.3	37.60	63.57
21.2	28.50	6.94	21.2	37.18	8.93	21.2	58.50	25.77	21.2	17.60	39.96	21.3	37.42	63.72
22.2	28.06	6.77	22.2	36.81	8.79	22.2	56.84	25.73	22.2	16.28	39.91	22.3	37.24	63.86
23.2	27.65	6.59	23.2	36.42	8.66	23.2	55.24	25.67	23.2	14.91	39.87	23.3	37.05	63.97
24.2	27.26	6.39	24.2	36.00	8.53	24.2	53.73	25.58	24.2	13.46	39.84	24.3	36.87	64.06
25.2	26.88	6.20	25.2	35.54	8.38	25.2	52.29	25.47	25.2	11.92	39.81	25.3	36.69	64.12
26.2	26.53	6.02	26.2	35.07	8.21	26.2	50.92	25.38	26.2	10.28	39.77	26.3	36.52	64.18
27.1	26.19	5.87	27.2	34.59	8.01	27.2	49.61	25.32	27.2	8.58	39.69	27.3	36.37	64.27
28.1	25.85	5.73	28.2	34.13	7.78	28.2	48.31	25.28	28.2	6.87	39.57	28.3	36.22	64.38
29.1	25.48	5.60	29.1	33.70	7.54	29.2	46.97	25.24	29.2	5.22	39.43	29.3	36.06	64.50
30.1	25.11	5.47	30.1	33.31	7.28	30.2	45.58	25.21	30.2	3.66	39.28	30.3	35.91	64.63
31.1	24.73	5.33	31.1	32.96	7.03	31.2	44.11	25.18	31.2	2.19	39.10	31.3	35.73	64.77
32.1	24.34	5.20	32.1	32.63	6.78	32.2	42.60	25.14	32.2	0.85	38.92	32.3	35.56	64.87
16.95	+16.93		24.59	-24.57		58.70	+58.69		74.21	-74.20		7.40	+7.33	
17 <sup>h</sup> 59 <sup>m</sup>	1° 30'		18 <sup>h</sup> 6 <sup>m</sup>	11° 89'		19 <sup>h</sup> 2 <sup>m</sup>	39° 62'		19 <sup>h</sup> 27 <sup>m</sup>	42° 21'		20 <sup>h</sup> 48 <sup>m</sup>	40° 49'	
+86° 36'	51' 17"		-87° 39'	51' 82"		+89° 1'	2' 17"		-89° 13'	28' 57"		+82° 13'	29' 86"	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Oct.	h m 21 38	° ' " -83 6	Oct.	h m 22 16	° ' " -86 23	Oct.	h m 22 37	° ' " -81 48	Oct.	h m 23 27	° ' " +86 51	Oct.	h m 23 47	° ' " -82 28
1.4	37.96	2.42	1.4	39.75	18.60	1.4	54.18	50.72	1.4	63.74	26.06	1.5	30.49	29.87
2.4	37.82	2.62	2.4	39.51	18.83	2.4	54.09	50.97	2.4	63.69	26.44	2.5	30.43	30.19
3.4	37.67	2.81	3.4	39.27	19.05	3.4	54.00	51.20	3.4	63.64	26.83	3.5	30.37	30.47
4.4	37.54	2.97	4.4	39.04	19.27	4.4	53.91	51.43	4.4	63.57	27.25	4.5	30.32	30.74
5.4	37.42	3.13	5.4	38.84	19.46	5.4	53.83	51.65	5.4	63.47	27.65	5.5	30.26	31.01
6.4	37.32	3.30	6.4	38.65	19.66	6.4	53.76	51.87	6.4	63.34	28.06	6.4	30.23	31.27
7.4	37.21	3.48	7.4	38.46	19.88	7.4	53.70	52.10	7.4	63.18	28.47	7.4	30.20	31.53
8.4	37.08	3.67	8.4	38.28	20.10	8.4	53.64	52.33	8.4	63.01	28.84	8.4	30.17	31.81
9.4	36.96	3.88	9.4	38.08	20.34	9.4	53.56	52.59	9.4	62.83	29.19	9.4	30.13	32.09
10.3	36.83	4.09	10.4	37.87	20.59	10.4	53.48	52.86	10.4	62.63	29.53	10.4	30.08	32.40
11.3	36.70	4.31	11.4	37.65	20.84	11.4	53.39	53.13	11.4	62.45	29.85	11.4	30.03	32.72
12.3	36.55	4.51	12.4	37.40	21.09	12.4	53.30	53.41	12.4	62.26	30.18	12.4	29.98	33.05
13.3	36.40	4.71	13.4	37.12	21.33	13.4	53.18	53.68	13.4	62.10	30.49	13.4	29.89	33.38
14.3	36.22	4.89	14.4	36.84	21.56	14.4	53.06	53.94	14.4	61.95	30.81	14.4	29.81	33.69
15.3	36.04	5.06	15.4	36.53	21.78	15.4	52.94	54.18	15.4	61.80	31.13	15.4	29.72	34.00
16.3	35.87	5.20	16.4	36.21	21.97	16.4	52.82	54.41	16.4	61.66	31.47	16.4	29.62	34.29
17.3	35.70	5.34	17.4	35.90	22.14	17.4	52.69	54.59	17.4	61.52	31.82	17.4	29.52	34.58
18.3	35.52	5.44	18.4	35.61	22.29	18.4	52.57	54.77	18.4	61.37	32.19	18.4	29.43	34.85
19.3	35.38	5.54	19.4	35.33	22.44	19.4	52.46	54.95	19.4	61.21	32.56	19.4	29.34	35.08
20.3	35.23	5.63	20.3	35.06	22.57	20.4	52.36	55.12	20.4	61.02	32.94	20.4	29.26	35.31
21.3	35.10	5.72	21.3	34.83	22.70	21.4	52.27	55.29	21.4	60.79	33.31	21.4	29.18	35.53
22.3	34.96	5.84	22.3	34.58	22.86	22.4	52.18	55.47	22.4	60.55	33.68	22.4	29.10	35.75
23.3	34.83	5.97	23.3	34.35	23.03	23.4	52.09	55.68	23.4	60.28	34.01	23.4	29.04	35.99
24.3	34.70	6.09	24.3	34.09	23.21	24.4	51.99	55.87	24.4	60.00	34.34	24.4	28.96	36.26
25.3	34.54	6.24	25.3	33.82	23.38	25.3	51.87	56.09	25.4	59.72	34.62	25.4	28.88	36.53
26.3	34.37	6.38	26.3	33.51	23.56	26.3	51.74	56.29	26.4	59.48	34.90	26.4	28.78	36.82
27.3	34.19	6.49	27.3	33.19	23.74	27.3	51.61	56.49	27.4	59.24	35.18	27.4	28.66	37.10
28.3	33.99	6.60	28.3	32.83	23.88	28.3	51.46	56.68	28.4	59.03	35.46	28.4	28.55	37.37
29.3	33.80	6.67	29.3	32.47	23.99	29.3	51.31	56.85	29.4	58.84	35.77	29.4	28.40	37.61
30.3	33.61	6.73	30.3	32.12	24.09	30.3	51.16	56.98	30.4	58.65	36.08	30.4	28.27	37.85
31.3	33.43	6.75	31.3	31.79	24.18	31.3	51.02	57.09	31.4	58.43	36.42	31.4	28.14	38.04
32.3	33.26	6.76	32.3	31.46	24.24	32.3	50.89	57.19	32.4	58.20	36.75	32.4	28.01	38.23
8.33	-8.27		15.88	-15.85		7.02	-6.95		18.25	+18.22		7.64	-7.57	
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542			22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656			22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016			23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125			23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424		
-83° 6' 6".99			-86° 23' 27".13			-81° 49' 2".34			+86° 50' 58".89			-82° 28' 48".41		



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "
Nov.	0 57	+85 49	Nov.	1 31	+88 52	Nov.	1 42	-85 11	Nov.	4 10	+85 20	Nov.	5 35	+85 9
	s	"		s	"		s	"		s	"		s	"
0.4	33.26	16.78	0.5	46.43	11.13	0.5	13.56	4.88	0.6	37.24	14.98	0.6	45.42	20.82
1.4	33.22	17.16	1.4	46.45	11.53	1.5	13.45	5.16	1.6	37.46	15.27	1.6	45.70	20.99
2.4	33.16	17.54	2.4	46.39	11.94	2.5	13.35	5.43	2.6	37.66	15.59	2.6	45.99	21.19
3.4	33.08	17.93	3.4	46.24	12.35	3.5	13.26	5.70	3.6	37.86	15.92	3.6	46.27	21.43
4.4	32.97	18.32	4.4	46.02	12.75	4.4	13.18	5.97	4.6	38.04	16.26	4.6	46.52	21.68
5.4	32.84	18.68	5.4	45.74	13.13	5.4	13.12	6.25	5.6	38.19	16.61	5.6	46.76	21.94
6.4	32.72	19.02	6.4	45.41	13.50	6.4	13.04	6.54	6.5	38.33	16.95	6.6	46.99	22.21
7.4	32.58	19.35	7.4	45.07	13.84	7.4	12.95	6.86	7.5	38.46	17.28	7.6	47.20	22.47
8.4	32.45	19.67	8.4	44.73	14.19	8.4	12.86	7.16	8.5	38.56	17.60	8.6	47.40	22.72
9.4	32.32	19.96	9.4	44.39	14.51	9.4	12.76	7.48	9.5	38.69	17.91	9.6	47.59	22.96
10.4	32.19	20.25	10.4	44.10	14.84	10.4	12.63	7.81	10.5	38.81	18.20	10.6	47.78	23.19
11.4	32.09	20.55	11.4	43.84	15.15	11.4	12.51	8.13	11.5	38.93	18.48	11.6	47.97	23.39
12.4	31.99	20.86	12.4	43.60	15.46	12.4	12.36	8.46	12.5	39.05	18.76	12.6	48.17	23.60
13.4	31.89	21.17	13.4	43.39	15.79	13.4	12.18	8.76	13.5	39.20	19.04	13.6	48.40	23.81
14.4	31.79	21.49	14.4	43.19	16.13	14.4	12.02	9.05	14.5	39.35	19.35	14.6	48.62	24.02
15.4	31.70	21.82	15.4	42.96	16.49	15.4	11.85	9.32	15.5	39.50	19.66	15.6	48.85	24.24
16.4	31.58	22.17	16.4	42.67	16.86	16.4	11.69	9.56	16.5	39.66	20.01	16.6	49.09	24.47
17.4	31.44	22.52	17.4	42.32	17.24	17.4	11.54	9.79	17.5	39.81	20.36	17.6	49.33	24.74
18.4	31.27	22.87	18.4	41.89	17.62	18.4	11.39	10.02	18.5	39.94	20.73	18.6	49.56	25.05
19.4	31.10	23.22	19.4	41.36	18.00	19.4	11.25	10.24	19.5	40.04	21.11	19.6	49.76	25.37
20.4	30.91	23.54	20.4	40.78	18.34	20.4	11.12	10.46	20.5	40.13	21.47	20.6	49.95	25.68
21.4	30.71	23.83	21.4	40.17	18.68	21.4	10.98	10.71	21.5	40.19	21.82	21.6	50.11	25.98
22.4	30.50	24.10	22.4	39.57	18.99	22.4	10.84	10.98	22.5	40.24	22.16	22.6	50.26	26.27
23.4	30.32	24.34	23.4	39.02	19.27	23.4	10.66	11.27	23.5	40.30	22.49	23.6	50.40	26.56
24.4	30.15	24.59	24.4	38.53	19.54	24.4	10.48	11.55	24.5	40.35	22.80	24.6	50.54	26.80
25.4	30.00	24.83	25.4	38.09	19.82	25.4	10.26	11.81	25.5	40.43	23.09	25.6	50.69	27.03
26.4	29.86	25.11	26.4	37.68	20.11	26.4	10.04	12.06	26.5	40.52	23.39	26.6	50.87	27.26
27.4	29.73	25.38	27.4	37.28	20.42	27.4	9.82	12.29	27.5	40.62	23.69	27.5	51.05	27.50
28.4	29.58	25.66	28.4	36.85	20.74	28.4	9.60	12.49	28.5	40.72	24.01	28.5	51.23	27.78
29.3	29.41	25.97	29.4	36.35	21.07	29.4	9.39	12.68	29.5	40.82	24.35	29.5	51.42	28.06
30.3	29.23	26.27	30.4	35.78	21.42	30.4	9.19	12.85	30.5	40.89	24.68	30.5	51.61	28.38
31.3	29.01	26.56	31.4	35.11	21.75	31.4	8.99	13.03	31.5	40.95	25.06	31.5	51.77	28.70
13.73	+13.69		50.76	+50.75		11.92	-11.87		12.31	+12.26		11.84	+11.80	
0 <sup>h</sup> 57 <sup>m</sup> 9 <sup>s</sup> .300			1 <sup>h</sup> 30 <sup>m</sup> 13 <sup>s</sup> .156			1 <sup>h</sup> 42 <sup>m</sup> 2 <sup>s</sup> .339			4 <sup>h</sup> 10 <sup>m</sup> 2 <sup>s</sup> .561			5 <sup>h</sup> 35 <sup>m</sup> 12 <sup>s</sup> .782		
+85° 48' 45".30			+88° 51' 43".55			-85° 11' 21".46			+85° 20' 10".34			+85° 9' 30".24		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 5 46	° ' -84 49	Nov.	h m 6 46	° ' -80 43	Nov.	h m 7 2	° ' +87 10	Nov.	h m 7 14	° ' +82 34	Nov.	h m 7 16	° ' -86 53
	s "	"		s "	"		s "	"		s "	"		s "	"
0.6	11.46	30.12	0.7	56.73	24.15	0.7	48.96	32.05	0.7	0.91	6.58	0.7	5.65	55.04
1.6	11.60	30.40	1.7	56.84	24.37	1.7	49.51	32.10	1.7	1.13	6.61	1.7	5.98	55.22
2.6	11.74	30.66	2.7	56.95	24.58	2.7	50.07	32.18	2.7	1.36	6.65	2.7	6.30	55.40
3.6	11.88	30.90	3.7	57.06	24.76	3.7	50.62	32.29	3.7	1.58	6.72	3.7	6.62	55.55
4.6	12.03	31.13	4.7	57.16	24.95	4.7	51.16	32.41	4.7	1.79	6.82	4.7	6.94	55.69
5.6	12.17	31.37	5.7	57.27	25.12	5.7	51.67	32.54	5.7	1.99	6.93	5.7	7.27	55.83
6.6	12.33	31.61	6.7	57.38	25.30	6.7	52.15	32.68	6.7	2.18	7.04	6.7	7.62	55.99
7.6	12.48	31.86	7.7	57.49	25.50	7.7	52.61	32.81	7.7	2.36	7.14	7.7	7.98	56.15
8.6	12.64	32.12	8.7	57.61	25.71	8.7	53.05	32.94	8.7	2.54	7.24	8.7	8.34	56.32
9.6	12.80	32.40	9.6	57.73	25.93	9.7	53.48	33.07	9.7	2.71	7.35	9.7	8.71	56.49
10.6	12.95	32.71	10.6	57.85	26.19	10.7	53.89	33.20	10.7	2.88	7.46	10.7	9.08	56.69
11.6	13.09	33.03	11.6	57.96	26.46	11.7	54.31	33.31	11.7	3.05	7.55	11.7	9.45	56.90
12.6	13.23	33.37	12.6	58.07	26.73	12.6	54.74	33.41	12.7	3.21	7.63	12.7	9.80	57.14
13.6	13.36	33.71	13.6	58.18	27.03	13.6	55.19	33.51	13.7	3.39	7.70	13.7	10.14	57.39
14.6	13.46	34.04	14.6	58.28	27.33	14.6	55.65	33.62	14.7	3.57	7.77	14.7	10.46	57.65
15.6	13.56	34.38	15.6	58.37	27.63	15.6	56.14	33.74	15.6	3.76	7.86	15.7	10.75	57.91
16.6	13.64	34.71	16.6	58.46	27.93	16.6	56.65	33.86	16.6	3.97	7.96	16.6	11.01	58.16
17.6	13.73	35.01	17.6	58.54	28.22	17.6	57.16	34.02	17.6	4.17	8.09	17.6	11.26	58.41
18.6	13.81	35.30	18.6	58.62	28.47	18.6	57.66	34.19	18.6	4.38	8.25	18.6	11.51	58.64
19.6	13.89	35.57	19.6	58.70	28.72	19.6	58.14	34.38	19.6	4.58	8.43	19.6	11.76	58.86
20.6	13.98	35.85	20.6	58.79	28.97	20.6	58.59	34.58	20.6	4.76	8.61	20.6	12.03	59.06
21.6	14.08	36.13	21.6	58.87	29.23	21.6	59.01	34.80	21.6	4.93	8.80	21.6	12.31	59.27
22.6	14.18	36.44	22.6	58.97	29.49	22.6	59.38	35.01	22.6	5.08	8.98	22.6	12.61	59.50
23.6	14.28	36.76	23.6	59.06	29.78	23.6	59.74	35.21	23.6	5.23	9.14	23.6	12.91	59.77
24.6	14.37	37.12	24.6	59.14	30.10	24.6	60.11	35.40	24.6	5.37	9.29	24.6	13.21	60.05
25.6	14.45	37.49	25.6	59.22	30.46	25.6	60.47	35.55	25.6	5.52	9.42	25.6	13.50	60.36
26.6	14.51	37.88	26.6	59.30	30.82	26.6	60.86	35.70	26.6	5.68	9.54	26.6	13.76	60.69
27.6	14.56	38.26	27.6	59.37	31.17	27.6	61.27	35.86	27.6	5.85	9.66	27.6	14.00	61.03
28.6	14.59	38.64	28.6	59.43	31.52	28.6	61.70	36.02	28.6	6.03	9.81	28.6	14.20	61.35
29.6	14.62	38.99	29.6	59.49	31.86	29.6	62.14	36.20	29.6	6.21	9.98	29.6	14.39	61.67
30.5	14.65	39.32	30.6	59.55	32.19	30.6	62.58	36.42	30.6	6.39	10.16	30.6	14.57	61.97
31.5	14.67	39.63	31.6	59.60	32.49	31.6	63.01	36.64	31.6	6.57	10.37	31.6	14.75	62.26
11.09	-11.04		6.20	-6.12		20.30	+20.27		7.73	+7.67		18.49	-18.46	
5 <sup>h</sup> 46 <sup>m</sup>	14°.756		6 <sup>h</sup> 46 <sup>m</sup>	58°.546		7 <sup>h</sup> 2 <sup>m</sup>	4°.048		7 <sup>h</sup> 13 <sup>m</sup>	42°.294		7 <sup>h</sup> 16 <sup>m</sup>	20°.292	
-84° 49'	46''.89		-80° 43'	38''.16		+87° 10'	54''.74		+82° 34'	30''.13		-86° 54'	6''.70	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			♄ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			♄ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "
Nov.	8 17	+88 52	Nov.	9 8	-85 19	Nov.	9 25	+81 41	Nov.	9 36	-80 34	Nov.	10 21	+82 58
0.7	6.01	28.92	0.8	46.39	53.92	0.8	30.46	6.05	0.8	18.39	5.23	0.8	9.55	16.71
1.7	7.37	28.86	1.8	46.67	53.97	1.8	30.63	5.85	1.8	18.52	5.25	1.8	9.72	16.44
2.7	8.76	28.80	2.8	46.92	54.01	2.8	30.81	5.66	2.8	18.66	5.25	2.8	9.92	16.19
3.7	10.17	28.77	3.8	47.17	54.02	3.8	31.01	5.51	3.8	18.79	5.24	3.8	10.11	15.95
4.7	11.56	28.78	4.8	47.41	54.03	4.8	31.20	5.37	4.8	18.92	5.22	4.8	10.32	15.72
5.7	12.91	28.79	5.8	47.66	54.03	5.8	31.38	5.25	5.8	19.04	5.19	5.8	10.51	15.51
6.7	14.20	28.81	6.8	47.93	54.04	6.8	31.56	5.15	6.8	19.18	5.17	6.8	10.70	15.34
7.7	15.44	28.84	7.8	48.19	54.04	7.8	31.73	5.06	7.8	19.32	5.14	7.8	10.89	15.16
8.7	16.64	28.87	8.7	48.47	54.05	8.8	31.89	4.98	8.8	19.45	5.12	8.8	11.06	14.98
9.7	17.80	28.88	9.7	48.75	54.07	9.8	32.04	4.89	9.8	19.59	5.11	9.8	11.23	14.82
10.7	18.92	28.89	10.7	49.05	54.12	10.8	32.19	4.81	10.8	19.74	5.13	10.8	11.40	14.66
11.7	20.04	28.91	11.7	49.35	54.17	11.8	32.34	4.71	11.8	19.90	5.16	11.8	11.56	14.49
12.7	21.17	28.91	12.7	49.64	54.25	12.8	32.50	4.60	12.8	20.05	5.20	12.8	11.72	14.30
13.7	22.32	28.90	13.7	49.94	54.36	13.7	32.66	4.48	13.8	20.20	5.26	13.8	11.88	14.11
14.7	23.55	28.90	14.7	50.23	54.48	14.7	32.83	4.35	14.8	20.35	5.35	14.8	12.06	13.91
15.7	24.83	28.91	15.7	50.50	54.61	15.7	33.00	4.22	15.7	20.51	5.45	15.8	12.24	13.72
16.7	26.16	28.93	16.7	50.76	54.75	16.7	33.19	4.12	16.7	20.65	5.56	16.8	12.44	13.51
17.7	27.52	28.97	17.7	51.00	54.87	17.7	33.39	4.02	17.7	20.79	5.64	17.8	12.66	13.32
18.7	28.90	29.02	18.7	51.24	54.97	18.7	33.58	3.95	18.7	20.92	5.75	18.8	12.88	13.18
19.7	30.25	29.10	19.7	51.48	55.08	19.7	33.79	3.90	19.7	21.04	5.84	19.8	13.10	13.03
20.7	31.54	29.19	20.7	51.71	55.16	20.7	33.97	3.86	20.7	21.16	5.90	20.8	13.33	12.92
21.7	32.75	29.30	21.7	51.96	55.25	21.7	34.16	3.86	21.7	21.29	5.96	21.8	13.52	12.82
22.7	33.88	29.42	22.7	52.23	55.37	22.7	34.33	3.85	22.7	21.43	6.03	22.8	13.71	12.73
23.7	34.95	29.52	23.7	52.51	55.50	23.7	34.47	3.83	23.7	21.57	6.11	23.8	13.89	12.64
24.7	35.97	29.62	24.7	52.79	55.64	24.7	34.62	3.80	24.7	21.72	6.22	24.8	14.07	12.53
25.7	37.02	29.68	25.7	53.08	55.80	25.7	34.77	3.76	25.7	21.87	6.35	25.8	14.23	12.43
26.7	38.10	29.73	26.7	53.36	55.99	26.7	34.93	3.70	26.7	22.03	6.54	26.7	14.40	12.30
27.7	39.24	29.77	27.7	53.63	56.22	27.7	35.10	3.63	27.7	22.18	6.72	27.7	14.58	12.16
28.7	40.44	29.84	28.7	53.88	56.45	28.7	35.28	3.56	28.7	22.32	6.92	28.7	14.78	12.04
29.7	41.69	29.93	29.7	54.12	56.64	29.7	35.46	3.52	29.7	22.46	7.11	29.7	15.00	11.90
30.7	42.95	30.02	30.7	54.34	56.84	30.7	35.65	3.50	30.7	22.58	7.29	30.7	15.22	11.80
31.7	44.21	30.16	31.7	54.55	57.04	31.7	35.85	3.49	31.7	22.71	7.48	31.7	15.45	11.71
50.92 +50.91			12.29 -12.25			6.91 +6.84			6.10 -6.02			8.17 +8.11		
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".07		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

7 Octantis. Mag. 6.3			Bradley 1872. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '	Nov.	h m	° '
	10 59	-84 8		12 13	+88 8		12 46	-84 40		12 48	+83 51		13 27	-85 21
	s	"		s	"		s	"		s	"		s	"
0.8	47.26	55.87	0.9	58.63	61.53	0.9	1.27	34.88	0.9	20.82	19.17	0.9	9.34	56.97
1.8	47.46	55.76	1.9	58.94	61.15	1.9	1.43	34.65	1.9	20.88	18.76	1.9	9.49	56.72
2.8	47.66	55.66	2.9	59.30	60.76	2.9	1.58	34.44	2.9	20.97	18.35	2.9	9.62	56.47
3.8	47.85	55.56	3.9	59.70	60.39	3.9	1.72	34.23	3.9	21.07	17.96	3.9	9.75	56.22
4.8	48.03	55.43	4.9	60.15	60.04	4.9	1.85	34.02	4.9	21.17	17.58	4.9	9.86	55.98
5.8	48.20	55.30	5.9	60.60	59.71	5.9	1.98	33.79	5.9	21.28	17.21	5.9	9.96	55.71
6.8	48.38	55.17	6.9	61.07	59.41	6.9	2.11	33.54	6.9	21.39	16.86	6.9	10.07	55.44
7.8	48.57	55.04	7.9	61.50	59.11	7.9	2.25	33.28	7.9	21.50	16.52	7.9	10.20	55.15
8.8	48.76	54.89	8.9	61.92	58.82	8.9	2.39	33.01	8.9	21.60	16.20	8.9	10.32	54.86
9.8	48.98	54.75	9.9	62.34	58.54	9.9	2.56	32.75	9.9	21.70	15.90	9.9	10.46	54.56
10.8	49.20	54.64	10.9	62.73	58.26	10.9	2.73	32.50	10.9	21.79	15.60	10.9	10.62	54.27
11.8	49.43	54.54	11.9	63.10	57.98	11.9	2.92	32.25	11.9	21.89	15.29	11.9	10.80	53.98
12.8	49.66	54.43	12.9	63.45	57.68	12.9	3.12	32.01	12.9	21.98	14.97	12.9	10.98	53.70
13.8	49.90	54.37	13.9	63.82	57.39	13.9	3.33	31.79	13.9	22.06	14.64	13.9	11.18	53.43
14.8	50.14	54.32	14.9	64.19	57.08	14.9	3.56	31.59	14.9	22.15	14.30	14.9	11.41	53.19
15.8	50.38	54.28	15.9	64.61	56.76	15.9	3.77	31.40	15.9	22.26	13.94	15.9	11.61	52.96
16.8	50.61	54.27	16.9	65.07	56.43	16.9	3.98	31.25	16.9	22.38	13.56	16.9	11.82	52.77
17.8	50.81	54.27	17.9	65.58	56.10	17.9	4.17	31.10	17.9	22.51	13.19	17.9	12.03	52.58
18.8	51.01	54.25	18.8	66.14	55.78	18.9	4.36	30.96	18.9	22.66	12.84	18.9	12.21	52.39
19.8	51.21	54.21	19.8	66.73	55.49	19.9	4.55	30.80	19.9	22.82	12.51	19.9	12.39	52.19
20.8	51.41	54.16	20.8	67.33	55.21	20.9	4.72	30.62	20.9	22.98	12.20	20.9	12.56	51.97
21.8	51.60	54.12	21.8	67.91	54.97	21.9	4.90	30.43	21.9	23.13	11.91	21.9	12.73	51.74
22.8	51.83	54.07	22.8	68.46	54.74	22.9	5.09	30.25	22.9	23.28	11.63	22.9	12.91	51.51
23.8	52.06	54.02	23.8	68.97	54.52	23.9	5.30	30.06	23.9	23.42	11.37	23.9	13.13	51.27
24.8	52.30	53.98	24.8	69.44	54.31	24.9	5.53	29.88	24.9	23.53	11.11	24.9	13.36	51.03
25.8	52.55	53.98	25.8	69.89	54.07	25.9	5.77	29.70	25.9	23.64	10.84	25.9	13.60	50.79
26.8	52.82	54.02	26.8	70.34	53.83	26.8	6.04	29.56	26.9	23.77	10.55	26.9	13.87	50.59
27.8	53.07	54.06	27.8	70.80	53.56	27.8	6.30	29.43	27.8	23.90	10.25	27.9	14.14	50.41
28.8	53.32	54.12	28.8	71.31	53.30	28.8	6.55	29.33	28.8	24.03	9.94	28.9	14.42	50.26
29.8	53.55	54.20	29.8	71.87	53.04	29.8	6.80	29.25	29.8	24.20	9.62	29.9	14.68	50.12
30.8	53.77	54.27	30.8	72.48	52.77	30.8	7.04	29.18	30.8	24.37	9.31	30.9	14.92	49.99
31.8	53.97	54.33	31.8	73.13	52.53	31.8	7.25	29.10	31.8	24.55	9.02	31.9	15.16	49.86
9.81	-9.76		30.96	+30.94		10.78	-10.73		9.34	+9.29		12.37	-12.33	
10 <sup>h</sup> 59 <sup>m</sup>	55° 28'		12 <sup>h</sup> 14 <sup>m</sup>	28° 42'		12 <sup>h</sup> 46 <sup>m</sup>	7° 15'		12 <sup>h</sup> 48 <sup>m</sup>	30° 41'		13 <sup>h</sup> 27 <sup>m</sup>	14° 62'	
-84° 8'	50° 00'		+88° 9'	36° 00'		-84° 40'	22° 34'		+83° 51'	50° 47'		-85° 21'	42° 23'	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			$\rho$ Octantis. Mag. 5.7			$\epsilon$ Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m	° ' "	Nov.	h m	° ' "	Nov.	h m	° ' "	Nov.	h m	° ' "	Nov.	h m	° ' "
	14 13	-83 17		15 2	+87 32		15 23	-84 11		16 54	+82 10		17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
0.9	27.06	37.31	1.0	49.61	55.81	1.0	58.95	48.07	1.1	10.38	36.67	1.1	1.24	22.51
1.9	27.14	37.02	2.0	49.40	55.44	2.0	58.96	47.79	2.1	10.24	36.39	2.1	1.20	22.26
2.9	27.20	36.76	3.0	49.21	55.02	3.0	58.97	47.51	3.1	10.11	36.09	3.1	1.16	22.02
3.9	27.25	36.49	4.0	49.07	54.61	4.0	58.98	47.23	4.1	9.98	35.78	4.1	1.11	21.79
4.9	27.30	36.22	5.0	48.96	54.23	5.0	58.98	46.95	5.1	9.89	35.45	5.1	1.06	21.56
5.9	27.35	35.95	6.0	48.87	53.85	6.0	58.97	46.67	6.1	9.77	35.12	6.1	0.99	21.33
6.9	27.39	35.67	6.9	48.81	53.47	7.0	58.96	46.35	7.1	9.67	34.80	7.1	0.92	21.09
7.9	27.43	35.36	7.9	48.76	53.09	8.0	58.95	46.03	8.1	9.58	34.50	8.1	0.84	20.83
8.9	27.49	35.05	8.9	48.70	52.74	9.0	58.94	45.71	9.1	9.49	34.20	9.1	0.78	20.56
9.9	27.55	34.73	9.9	48.64	52.40	10.0	58.93	45.35	10.1	9.40	33.90	10.1	0.72	20.27
10.9	27.63	34.41	10.9	48.57	52.07	11.0	58.96	45.01	11.1	9.31	33.62	11.1	0.65	19.96
11.9	27.71	34.10	11.9	48.49	51.75	11.9	58.98	44.66	12.1	9.21	33.35	12.1	0.60	19.63
12.9	27.81	33.79	12.9	48.40	51.42	12.9	59.02	44.32	13.1	9.11	33.10	13.1	0.55	19.30
13.9	27.91	33.49	13.9	48.30	51.06	13.9	59.07	43.98	14.1	9.02	32.82	14.1	0.53	18.99
14.9	28.04	33.21	14.9	48.20	50.71	14.9	59.16	43.66	15.1	8.92	32.52	15.1	0.51	18.67
15.9	28.16	32.96	15.9	48.10	50.34	15.9	59.24	43.34	16.1	8.81	32.21	16.1	0.50	18.36
16.9	28.30	32.72	16.9	48.02	49.93	16.9	59.32	43.06	17.0	8.72	31.85	17.1	0.49	18.07
17.9	28.40	32.49	17.9	47.98	49.53	17.9	59.40	42.78	18.0	8.63	31.49	18.1	0.49	17.80
18.9	28.51	32.27	18.9	47.97	49.12	18.9	59.48	42.52	19.0	8.54	31.12	19.1	0.49	17.54
19.9	28.61	32.04	19.9	48.01	48.71	19.9	59.53	42.26	20.0	8.47	30.75	20.1	0.47	17.27
20.9	28.70	31.80	20.9	48.07	48.33	20.9	59.58	42.00	21.0	8.41	30.37	21.1	0.44	17.02
21.9	28.79	31.53	21.9	48.15	47.95	21.9	59.62	41.71	22.0	8.36	30.02	22.0	0.40	16.76
22.9	28.89	31.26	22.9	48.22	47.61	22.9	59.67	41.40	23.0	8.30	29.69	23.0	0.37	16.46
23.9	29.00	30.97	23.9	48.28	47.28	23.9	59.74	41.07	24.0	8.24	29.37	24.0	0.34	16.13
24.9	29.13	30.69	24.9	48.32	46.96	24.9	59.82	40.72	25.0	8.19	29.10	25.0	0.32	15.77
25.9	29.27	30.41	25.9	48.33	46.64	25.9	59.92	40.39	26.0	8.13	28.82	26.0	0.31	15.42
26.9	29.44	30.16	26.9	48.33	46.32	26.9	60.05	40.07	27.0	8.07	28.52	27.0	0.32	15.06
27.9	29.62	29.92	27.9	48.33	45.96	27.9	60.19	39.76	28.0	8.00	28.21	28.0	0.35	14.73
28.9	29.79	29.72	28.9	48.36	45.60	28.9	60.33	39.48	29.0	7.93	27.88	29.0	0.37	14.42
29.9	29.95	29.53	29.9	48.40	45.23	29.9	60.47	39.22	30.0	7.87	27.51	30.0	0.40	14.11
30.9	30.10	29.35	30.9	48.48	44.85	30.9	60.60	38.97	31.0	7.82	27.13	31.0	0.43	13.82
31.9	30.25	29.18	31.9	48.61	44.47	31.9	60.72	38.73	32.0	7.77	26.76	32.0	0.45	13.55
8.56	-8.50		23.37	+23.35		9.89	-9.84		7.35	+7.28		6.25	-6.17	
14 <sup>h</sup> 13 <sup>m</sup>	27 <sup>s</sup> .793		15 <sup>h</sup> 2 <sup>m</sup>	41 <sup>s</sup> .175		15 <sup>h</sup> 23 <sup>m</sup>	56 <sup>s</sup> .594		16 <sup>h</sup> 54 <sup>m</sup>	25 <sup>s</sup> .488		17 <sup>h</sup> 15 <sup>m</sup>	54 <sup>s</sup> .896	
-83° 17'	21''.03		+87° 33'	10''.52		-84° 11'	30''.39		+82° 10'	32''.75		-80° 47'	6''.56	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			78 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m 17 58	° ' " +86 36	Nov.	h m 18 6	° ' " -87 39	Nov.	h m 19 0	° ' " +89 1	Nov.	h m 19 28	° ' " -89 13	Nov.	h m 20 48	° ' " +82 14
	s "	"		s "	"		s "	"		s "	"		s "	"
1.1	24.34	65.20	1.1	32.63	66.78	1.2	42.60	25.14	1.2	60.85	38.92	1.3	35.56	4.87
2.1	23.93	65.02	2.1	32.34	66.53	2.2	41.06	25.06	2.2	59.57	38.77	2.3	35.39	4.98
3.1	23.54	64.80	3.1	32.05	66.32	3.2	39.50	24.96	3.2	58.31	38.64	3.2	35.21	5.07
4.1	23.15	64.57	4.1	31.74	66.12	4.2	37.98	24.83	4.2	57.06	38.53	4.2	35.02	5.13
5.1	22.78	64.34	5.1	31.42	65.91	5.2	36.52	24.69	5.2	55.76	38.41	5.2	34.84	5.18
6.1	22.45	64.10	6.1	31.07	65.71	6.2	35.11	24.55	6.2	54.42	38.28	6.2	34.65	5.19
7.1	22.13	63.86	7.1	30.71	65.48	7.2	33.77	24.40	7.2	52.98	38.15	7.2	34.47	5.20
8.1	21.82	63.62	8.1	30.33	65.26	8.2	32.49	24.25	8.2	51.51	38.02	8.2	34.30	5.18
9.1	21.52	63.38	9.1	29.95	65.02	9.2	31.25	24.11	9.2	50.00	37.85	9.2	34.13	5.18
10.1	21.23	63.17	10.1	29.57	64.75	10.2	30.05	23.96	10.2	48.47	37.68	10.2	33.98	5.21
11.1	20.94	62.98	11.1	29.21	64.47	11.2	28.86	23.83	11.2	46.96	37.49	11.2	33.82	5.24
12.1	20.65	62.78	12.1	28.87	64.16	12.1	27.66	23.73	12.2	45.47	37.27	12.2	33.66	5.25
13.1	20.34	62.58	13.1	28.58	63.85	13.1	26.43	23.63	13.2	44.06	37.04	13.2	33.50	5.27
14.1	20.03	62.38	14.1	28.29	63.55	14.1	25.16	23.50	14.2	42.73	36.81	14.2	33.34	5.31
15.1	19.71	62.17	15.1	28.06	63.23	15.1	23.83	23.37	15.2	41.52	36.57	15.2	33.17	5.36
16.1	19.38	61.93	16.1	27.87	62.94	16.1	22.46	23.26	16.2	40.42	36.34	16.2	33.00	5.39
17.1	19.04	61.68	17.1	27.70	62.64	17.1	21.06	23.10	17.2	39.41	36.11	17.2	32.82	5.40
18.1	18.71	61.40	18.1	27.54	62.38	18.1	19.65	22.92	18.2	38.44	35.92	18.2	32.64	5.39
19.1	18.40	61.11	19.1	27.36	62.13	19.1	18.28	22.71	19.1	37.46	35.71	19.2	32.46	5.35
20.1	18.11	60.80	20.1	27.17	61.89	20.1	16.99	22.49	20.1	36.44	35.51	20.2	32.27	5.30
21.1	17.85	60.48	21.1	26.94	61.65	21.1	15.78	22.27	21.1	35.33	35.33	21.2	32.09	5.21
22.1	17.61	60.20	22.1	26.68	61.37	22.1	14.66	22.05	22.1	34.13	35.13	22.2	31.92	5.12
23.1	17.38	59.91	23.1	26.43	61.07	23.1	13.62	21.85	23.1	32.88	34.90	23.2	31.77	5.06
24.1	17.16	59.65	24.1	26.17	60.75	24.1	12.62	21.65	24.1	31.60	34.64	24.2	31.61	4.99
25.1	16.94	59.42	25.1	25.96	60.41	25.1	11.61	21.47	25.1	30.37	34.36	25.2	31.47	4.93
26.1	16.72	59.18	26.1	25.78	60.05	26.1	10.56	21.30	26.1	29.23	34.07	26.2	31.32	4.89
27.1	16.46	58.95	27.1	25.66	59.68	27.1	9.46	21.13	27.1	28.21	33.75	27.2	31.18	4.85
28.1	16.19	58.70	28.1	25.56	59.34	28.1	8.30	20.97	28.1	27.33	33.44	28.2	31.02	4.81
29.1	15.93	58.43	29.1	25.51	58.99	29.1	7.11	20.78	29.1	26.54	33.14	29.2	30.85	4.77
30.1	15.68	58.14	30.1	25.45	58.70	30.1	5.90	20.56	30.1	25.82	32.86	30.2	30.68	4.70
31.1	15.43	57.83	31.1	25.40	58.40	31.1	4.72	20.32	31.1	25.13	32.59	31.2	30.51	4.61
32.1	15.20	57.50	32.1	25.34	58.10	32.1	3.59	20.06	32.1	24.41	32.33	32.2	30.33	4.51
16.95	+16.92		24.57	-24.55		58.66	+58.65		74.11	-74.10		7.40	+7.33	
17 <sup>h</sup> 59 <sup>m</sup>	1° 307		18 <sup>h</sup> 6 <sup>m</sup>	11° 893		19 <sup>h</sup> 2 <sup>m</sup>	39° 624		19 <sup>h</sup> 27 <sup>m</sup>	42° 218		20 <sup>h</sup> 48 <sup>m</sup>	40° 494	
+86° 36'	51'' 17		-87° 39'	51'' 82		+89° 1'	2'' 17		-89° 13'	28'' 57		+82° 13'	29'' 86	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Nov.	h m    ° ' "		Nov.	h m    ° ' "		Nov.	h m    ° ' "		Nov.	h m    ° ' "		Nov.	h m    ° ' "	
	21 38    -83 6			22 16    -86 23			22 37    -81 48			23 27    +86 51			23 47    -82 28	
	s        "        "			s        "        "			s        "        "			s        "        "			s        "        "	
1.3	33.26    6.76	1.3	31.46    24.24	1.3	50.89    57.19	1.4	58.20    36.75	1.4	28.01    38.23					
2.3	33.11    6.77	2.3	31.16    24.31	2.3	50.77    57.28	2.4	57.94    37.09	2.4	27.92    38.41					
3.3	32.97    6.81	3.3	30.88    24.38	3.3	50.64    57.37	3.4	57.66    37.41	3.4	27.81    38.60					
4.3	32.82    6.86	4.3	30.60    24.48	4.3	50.53    57.50	4.4	57.35    37.70	4.4	27.71    38.78					
5.3	32.67    6.91	5.3	30.31    24.58	5.3	50.41    57.62	5.4	57.02    37.99	5.4	27.60    38.97					
6.3	32.50    6.96	6.3	30.00    24.68	6.3	50.30    57.74	6.4	56.69    38.26	6.4	27.49    39.18					
7.3	32.34    7.02	7.3	29.69    24.77	7.3	50.17    57.88	7.3	56.37    38.49	7.4	27.38    39.39					
8.3	32.16    7.08	8.3	29.37    24.87	8.3	50.03    58.02	8.3	56.05    38.73	8.4	27.25    39.61					
9.3	31.98    7.13	9.3	29.03    24.97	9.3	49.88    58.15	9.3	55.74    38.96	9.4	27.11    39.83					
10.3	31.79    7.15	10.3	28.66    25.07	10.3	49.73    58.28	10.3	55.45    39.19	10.4	26.97    40.05					
11.3	31.59    7.16	11.3	28.29    25.14	11.3	49.56    58.38	11.3	55.17    39.42	11.4	26.82    40.26					
12.3	31.40    7.16	12.3	27.90    25.18	12.3	49.40    58.47	12.3	54.90    39.66	12.3	26.65    40.46					
13.3	31.21    7.13	13.3	27.52    25.21	13.3	49.24    58.55	13.3	54.63    39.90	13.3	26.49    40.64					
14.3	31.01    7.09	14.3	27.16    25.22	14.3	49.08    58.60	14.3	54.36    40.16	14.3	26.34    40.78					
15.3	30.83    7.04	15.3	26.80    25.21	15.3	48.93    58.63	15.3	54.08    40.40	15.3	26.19    40.92					
16.2	30.68    6.96	16.3	26.47    25.17	16.3	48.80    58.63	16.3	53.77    40.63	16.3	26.04    41.04					
17.2	30.53    6.89	17.3	26.15    25.14	17.3	48.67    58.64	17.3	53.43    40.95	17.3	25.91    41.14					
18.2	30.38    6.83	18.3	25.86    25.12	18.3	48.54    58.67	18.3	53.07    41.22	18.3	25.77    41.24					
19.2	30.24    6.78	19.3	25.57    25.12	19.3	48.42    58.70	19.3	52.69    41.45	19.3	25.65    41.35					
20.2	30.10    6.74	20.3	25.27    25.12	20.3	48.30    58.74	20.3	52.28    41.65	20.3	25.52    41.47					
21.2	29.94    6.71	21.3	24.96    25.13	21.3	48.17    58.78	21.3	51.90    41.85	21.3	25.39    41.61					
22.2	29.77    6.68	22.3	24.64    25.14	22.3	48.03    58.84	22.3	51.52    42.02	22.3	25.25    41.74					
23.2	29.59    6.64	23.3	24.28    25.15	23.3	47.86    58.90	23.3	51.18    42.18	23.3	25.09    41.88					
24.2	29.39    6.58	24.3	23.90    25.15	24.3	47.70    58.94	24.3	50.85    42.35	24.3	24.92    42.02					
25.2	29.20    6.50	25.2	23.51    25.11	25.3	47.53    58.94	25.3	50.53    42.50	25.3	24.74    42.15					
26.2	29.01    6.38	26.2	23.13    25.05	26.3	47.36    58.92	26.3	50.24    42.66	26.3	24.57    42.25					
27.2	28.83    6.24	27.2	22.75    24.96	27.3	47.20    58.88	27.3	49.93    42.86	27.3	24.39    42.33					
28.2	28.66    6.07	28.2	22.40    24.86	28.3	47.05    58.82	28.3	49.61    43.06	28.3	24.23    42.39					
29.2	28.52    5.92	29.2	22.08    24.75	29.3	46.92    58.76	29.3	49.25    43.26	29.3	24.06    42.42					
30.2	28.38    5.78	30.2	21.77    24.65	30.3	46.78    58.68	30.3	48.88    43.47	30.3	23.92    42.44					
31.2	28.24    5.65	31.2	21.49    24.54	31.2	46.66    58.62	31.3	48.47    43.65	31.3	23.78    42.47					
32.2	28.11    5.55	32.2	21.20    24.46	32.2	46.53    58.58	32.3	48.06    43.78	32.3	23.64    42.50					
8.33	-8.27	15.88	-15.85	7.02	-6.95	18.26	+18.24	7.64	-7.57					
21 <sup>h</sup> 38 <sup>m</sup> 19 <sup>s</sup> .542		22 <sup>h</sup> 16 <sup>m</sup> 8 <sup>s</sup> .656		22 <sup>h</sup> 37 <sup>m</sup> 39 <sup>s</sup> .016		23 <sup>h</sup> 27 <sup>m</sup> 44 <sup>s</sup> .125		23 <sup>h</sup> 47 <sup>m</sup> 16 <sup>s</sup> .424						
-83° 6' 6".99		-86° 23' 27".13		-81° 49' 2".34		+86° 50' 58".89		-82° 28' 48".42						

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			$\alpha$ Ursæ Minoris. (Polaris.) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
	h m ° ' "			h m ° ' "			h m ° ' "			h m ° ' "			h m ° ' "	
Dec.	0 57 s	+85 49 "	Dec.	1 31 s	+88 52 "	Dec.	1 42 s	-85 11 "	Dec.	4 10 s	+85 20 "	Dec.	5 35 s	+85 9 "
0.3	29.23	26.27	0.4	35.78	21.42	0.4	9.19	12.85	0.5	40.89	24.68	0.5	51.61	28.38
1.3	29.01	26.56	1.4	35.11	21.75	1.4	8.99	13.03	1.5	40.95	25.06	1.5	51.77	28.70
2.3	28.79	26.83	2.4	34.39	22.05	2.4	8.80	13.21	2.5	40.99	25.44	2.5	51.92	29.03
3.3	28.55	27.07	3.4	33.61	22.34	3.4	8.62	13.41	3.5	41.01	25.81	3.5	52.05	29.36
4.3	28.30	27.31	4.4	32.81	22.63	4.4	8.43	13.59	4.5	41.02	26.16	4.5	52.15	29.69
5.3	28.05	27.53	5.4	32.00	22.88	5.4	8.24	13.80	5.5	41.02	26.50	5.5	52.25	30.01
6.3	27.81	27.73	6.4	31.22	23.13	6.4	8.04	14.01	6.5	41.00	26.84	6.5	52.34	30.32
7.3	27.58	27.92	7.3	30.46	23.36	7.4	7.81	14.21	7.5	40.99	27.15	7.5	52.41	30.62
8.3	27.36	28.10	8.3	29.73	23.57	8.4	7.58	14.42	8.5	40.98	27.44	8.5	52.49	30.90
9.3	27.16	28.29	9.3	29.03	23.80	9.4	7.34	14.63	9.5	40.97	27.73	9.5	52.58	31.18
10.3	26.95	28.47	10.3	28.38	24.02	10.4	7.08	14.82	10.5	40.97	28.01	10.5	52.67	31.45
11.3	26.75	28.66	11.3	27.72	24.26	11.3	6.81	14.97	11.5	40.99	28.32	11.5	52.77	31.72
12.3	26.55	28.86	12.3	27.07	24.53	12.3	6.54	15.12	12.4	41.00	28.63	12.5	52.88	32.00
13.3	26.36	29.09	13.3	26.39	24.79	13.3	6.29	15.25	13.4	41.04	28.96	13.5	53.01	32.31
14.3	26.13	29.33	14.3	25.65	25.06	14.3	6.04	15.35	14.4	41.05	29.31	14.5	53.13	32.62
15.3	25.89	29.55	15.3	24.82	25.33	15.3	5.80	15.45	15.4	41.06	29.68	15.5	53.24	32.96
16.3	25.61	29.75	16.3	23.92	25.61	16.3	5.57	15.53	16.4	41.03	30.05	16.5	53.34	33.32
17.3	25.33	29.95	17.3	22.95	25.86	17.3	5.35	15.62	17.4	41.00	30.43	17.5	53.41	33.69
18.3	25.04	30.13	18.3	21.93	26.07	18.3	5.13	15.71	18.4	40.94	30.77	18.5	53.45	34.04
19.3	24.75	30.27	19.3	20.93	26.27	19.3	4.91	15.84	19.4	40.86	31.10	19.5	53.49	34.38
20.3	24.46	30.40	20.3	19.95	26.45	20.3	4.67	15.97	20.4	40.77	31.40	20.5	53.49	34.72
21.3	24.21	30.50	21.3	19.04	26.59	21.3	4.40	16.11	21.4	40.68	31.69	21.5	53.51	35.02
22.3	23.97	30.60	22.3	18.19	26.74	22.3	4.13	16.25	22.4	40.63	31.95	22.5	53.52	35.28
23.3	23.74	30.71	23.3	17.39	26.89	23.3	3.85	16.36	23.4	40.57	32.22	23.5	53.56	35.55
24.3	23.52	30.84	24.3	16.62	27.07	24.3	3.54	16.46	24.4	40.53	32.48	24.5	53.60	35.81
25.3	23.29	30.97	25.3	15.84	27.24	25.3	3.25	16.51	25.4	40.49	32.75	25.5	53.66	36.11
26.3	23.06	31.12	26.3	15.01	27.44	26.3	2.97	16.57	26.4	40.45	33.06	26.5	53.71	36.40
27.3	22.80	31.27	27.3	14.11	27.64	27.3	2.69	16.60	27.4	40.41	33.37	27.5	53.77	36.72
28.3	22.53	31.40	28.3	13.13	27.84	28.3	2.42	16.61	28.4	40.33	33.69	28.5	53.81	37.07
29.3	22.24	31.54	29.3	12.07	28.02	29.3	2.18	16.62	29.4	40.24	34.02	29.5	53.83	37.42
30.3	21.93	31.63	30.3	10.97	28.17	30.3	1.94	16.62	30.4	40.14	34.34	30.5	53.82	37.78
31.3	21.62	31.72	31.3	9.86	28.31	31.3	1.69	16.67	31.4	40.01	34.65	31.5	53.79	38.13
13.74	+13.70		50.87	+50.86		11.92	-11.88		12.31	+12.27		11.85	+11.81	
0 <sup>h</sup> 57 <sup>m</sup>	9 <sup>s</sup> .300		1 <sup>h</sup> 30 <sup>m</sup>	13 <sup>s</sup> .156		1 <sup>h</sup> 42 <sup>m</sup>	2 <sup>s</sup> .339		4 <sup>h</sup> 10 <sup>m</sup>	2 <sup>s</sup> .561		5 <sup>h</sup> 35 <sup>m</sup>	12 <sup>s</sup> .782	
+85° 48'	45'' .30		+88° 51'	43'' .55		-85° 11'	21'' .46		+85° 20'	10'' .34		+85° 9'	30'' .24	



## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			♄ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			35 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m 5 46 s	° ' -84 49 "	Dec.	h m 6 46 s	° ' -80 43 "	Dec.	h m 7 3 s	° ' +87 10 "	Dec.	h m 7 14 s	° ' +82 34 "	Dec.	h m 7 16 s	° ' -86 54 "
0.5	14.65	39.32	0.6	59.55	32.19	0.6	2.58	36.42	0.6	6.39	10.16	0.6	14.57	1.97
1.5	14.67	39.63	1.6	59.60	32.49	1.6	3.01	36.64	1.6	6.57	10.37	1.6	14.75	2.26
2.5	14.70	39.94	2.6	59.66	32.79	2.6	3.40	36.89	2.6	6.73	10.59	2.6	14.93	2.53
3.5	14.73	40.25	3.6	59.72	33.08	3.6	3.76	37.17	3.6	6.88	10.82	3.6	15.12	2.80
4.5	14.78	40.56	4.6	59.78	33.38	4.6	4.10	37.43	4.6	7.02	11.06	4.6	15.32	3.08
5.5	14.82	40.89	5.6	59.83	33.69	5.6	4.42	37.69	5.6	7.15	11.30	5.6	15.53	3.35
6.5	14.86	41.24	6.6	59.89	34.01	6.6	4.71	37.94	6.6	7.28	11.53	6.6	15.75	3.64
7.5	14.89	41.60	7.6	59.95	34.36	7.6	4.99	38.19	7.6	7.39	11.76	7.6	15.96	3.96
8.5	14.91	41.96	8.6	60.01	34.72	8.6	5.27	38.42	8.6	7.50	11.97	8.6	16.16	4.29
9.5	14.92	42.36	9.6	60.06	35.10	9.6	5.55	38.64	9.6	7.62	12.17	9.6	16.35	4.64
10.5	14.93	42.75	10.6	60.10	35.50	10.6	5.84	38.86	10.6	7.75	12.36	10.6	16.53	5.01
11.5	14.93	43.13	11.6	60.15	35.89	11.6	6.14	39.09	11.6	7.87	12.56	11.6	16.68	5.37
12.5	14.89	43.51	12.6	60.18	36.28	12.6	6.46	39.31	12.6	7.99	12.75	12.6	16.81	5.73
13.5	14.85	43.88	13.6	60.20	36.67	13.6	6.80	39.54	13.6	8.15	12.97	13.6	16.91	6.10
14.5	14.81	44.22	14.6	60.22	37.03	14.6	7.14	39.80	14.6	8.30	13.19	14.6	16.99	6.44
15.5	14.76	44.55	15.6	60.24	37.37	15.6	7.49	40.07	15.6	8.45	13.45	15.6	17.05	6.78
16.5	14.71	44.87	16.6	60.26	37.70	16.6	7.82	40.37	16.6	8.59	13.72	16.6	17.11	7.10
17.5	14.67	45.17	17.6	60.27	38.02	17.6	8.11	40.69	17.6	8.71	14.00	17.6	17.19	7.40
18.5	14.64	45.49	18.6	60.29	38.35	18.6	8.36	41.00	18.6	8.82	14.29	18.6	17.27	7.70
19.5	14.61	45.81	19.6	60.31	38.68	19.6	8.58	41.30	19.6	8.92	14.59	19.6	17.37	8.01
20.5	14.58	46.14	20.6	60.33	39.03	20.6	8.77	41.59	20.6	9.01	14.87	20.6	17.48	8.34
21.5	14.55	46.51	21.6	60.35	39.41	21.6	8.94	41.87	21.6	9.08	15.12	21.6	17.60	8.70
22.5	14.51	46.90	22.6	60.37	39.81	22.6	9.11	42.12	22.6	9.16	15.36	22.6	17.70	9.07
23.5	14.45	47.29	23.6	60.39	40.22	23.6	9.30	42.36	23.6	9.25	15.59	23.6	17.77	9.46
24.5	14.37	47.68	24.6	60.40	40.64	24.6	9.51	42.61	24.6	9.33	15.82	24.6	17.83	9.87
25.5	14.28	48.05	25.6	60.40	41.04	25.6	9.73	42.87	25.6	9.44	16.04	25.6	17.85	10.27
26.5	14.17	48.42	26.6	60.39	41.43	26.6	9.98	43.14	26.6	9.55	16.29	26.6	17.85	10.65
27.5	14.07	48.75	27.6	60.38	41.80	27.6	10.21	43.43	27.6	9.65	16.55	27.6	17.82	11.02
28.5	13.97	49.07	28.6	60.36	42.15	28.6	10.44	43.75	28.6	9.75	16.84	28.6	17.79	11.37
29.5	13.86	49.36	29.6	60.34	42.49	29.6	10.65	44.09	29.6	9.85	17.15	29.6	17.76	11.71
30.5	13.76	49.67	30.6	60.33	42.82	30.6	10.83	44.43	30.6	9.94	17.47	30.6	17.75	12.03
31.5	13.67	49.98	31.6	60.32	43.16	31.6	10.97	44.78	31.6	10.00	17.79	31.6	17.74	12.37
11.10	-11.05		6.20	-6.12		20.31	+20.28		7.73	+7.67		18.50	-18.48	
5 <sup>h</sup> 46 <sup>m</sup>	14°.756		6 <sup>h</sup> 46 <sup>m</sup>	58°.546		7 <sup>h</sup> 2 <sup>m</sup>	4°.048		7 <sup>h</sup> 13 <sup>m</sup>	42°.294		7 <sup>h</sup> 16 <sup>m</sup>	20°.292	
-84° 49'	46''.89		-80° 43'	38''.16		+87° 10'	54''.74		+82° 34'	30''.13		-86° 54'	6''.70	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m 8 17 s	° ' " +88 52	Dec.	h m 9 8 s	° ' " -85 19	Dec.	h m 9 25 s	° ' " +81 41	Dec.	h m 9 36 s	° ' " -80 34	Dec.	h m 10 21 s	° ' " +82 58
0.7	42.95	30.02	0.7	54.34	56.84	0.7	35.65	3.50	0.7	22.58	7.29	0.7	15.22	11.80
1.7	44.21	30.16	1.7	54.55	57.04	1.7	35.85	3.49	1.7	22.71	7.48	1.7	15.45	11.71
2.6	45.41	30.31	2.7	54.76	57.22	2.7	36.03	3.52	2.7	22.83	7.62	2.7	15.67	11.65
3.6	46.56	30.48	3.7	54.98	57.40	3.7	36.22	3.56	3.7	22.95	7.77	3.7	15.87	11.61
4.6	47.65	30.66	4.7	55.21	57.58	4.7	36.39	3.60	4.7	23.08	7.92	4.7	16.08	11.60
5.6	48.68	30.83	5.7	55.44	57.75	5.7	36.55	3.66	5.7	23.20	8.06	5.7	16.27	11.59
6.6	49.64	31.01	6.7	55.68	57.93	6.7	36.70	3.74	6.7	23.33	8.22	6.7	16.47	11.58
7.6	50.57	31.19	7.7	55.93	58.13	7.7	36.86	3.81	7.7	23.46	8.41	7.7	16.64	11.57
8.6	51.47	31.34	8.7	56.17	58.36	8.7	36.99	3.87	8.7	23.60	8.61	8.7	16.82	11.56
9.6	52.37	31.49	9.7	56.41	58.59	9.7	37.14	3.92	9.7	23.74	8.83	9.7	16.99	11.54
10.6	53.29	31.63	10.7	56.66	58.86	10.7	37.28	3.97	10.7	23.87	9.06	10.7	17.17	11.51
11.6	54.24	31.78	11.7	56.90	59.13	11.7	37.44	4.02	11.7	24.00	9.33	11.7	17.34	11.48
12.6	55.24	31.91	12.7	57.11	59.42	12.7	37.61	4.04	12.7	24.13	9.59	12.7	17.54	11.43
13.6	56.30	32.08	13.7	57.31	59.71	13.7	37.78	4.08	13.7	24.25	9.86	13.7	17.73	11.38
14.6	57.38	32.24	14.7	57.50	60.00	14.7	37.96	4.12	14.7	24.36	10.13	14.7	17.96	11.33
15.6	58.49	32.43	15.6	57.67	60.29	15.7	38.14	4.20	15.7	24.47	10.40	15.7	18.17	11.33
16.6	59.58	32.64	16.6	57.84	60.56	16.7	38.33	4.30	16.7	24.58	10.64	16.7	18.40	11.33
17.6	60.61	32.88	17.6	58.00	60.81	17.7	38.50	4.42	17.7	24.67	10.89	17.7	18.62	11.37
18.6	61.55	33.14	18.6	58.17	61.04	18.7	38.66	4.56	18.7	24.77	11.12	18.7	18.82	11.43
19.6	62.40	33.37	19.6	58.35	61.28	19.7	38.81	4.71	19.7	24.87	11.35	19.7	19.01	11.51
20.6	63.15	33.62	20.6	58.54	61.55	20.6	38.95	4.85	20.7	24.98	11.59	20.7	19.19	11.59
21.6	63.86	33.86	21.6	58.74	61.83	21.6	39.08	4.99	21.6	25.10	11.86	21.7	19.36	11.65
22.6	64.55	34.06	22.6	58.94	62.13	22.6	39.20	5.12	22.6	25.23	12.13	22.7	19.52	11.70
23.6	65.27	34.26	23.6	59.15	62.44	23.6	39.33	5.22	23.6	25.35	12.45	23.7	19.68	11.75
24.6	66.02	34.46	24.6	59.34	62.78	24.6	39.47	5.31	24.6	25.45	12.77	24.7	19.84	11.78
25.6	66.84	34.64	25.6	59.51	63.15	25.6	39.61	5.40	25.6	25.56	13.11	25.7	20.03	11.82
26.6	67.68	34.84	26.6	59.66	63.52	26.6	39.76	5.51	26.6	25.66	13.44	26.7	20.21	11.85
27.6	68.56	35.07	27.6	59.80	63.86	27.6	39.92	5.64	27.6	25.76	13.77	27.7	20.42	11.90
28.6	69.43	35.33	28.6	59.93	64.19	28.6	40.08	5.78	28.6	25.84	14.10	28.7	20.62	11.96
29.6	70.25	35.60	29.6	60.03	64.51	29.6	40.24	5.96	29.6	25.93	14.40	29.7	20.83	12.07
30.6	71.03	35.88	30.6	60.15	64.80	30.6	40.38	6.14	30.6	26.00	14.71	30.7	21.02	12.18
31.6	71.73	36.17	31.6	60.28	65.10	31.6	40.52	6.33	31.6	26.08	14.99	31.7	21.21	12.33
50.96	+50.95		12.29	-12.25		6.91	+6.84		6.10	-6.02		8.17	+8.11	
8 <sup>h</sup> 15 <sup>m</sup> 48 <sup>s</sup> .380			9 <sup>h</sup> 8 <sup>m</sup> 57 <sup>s</sup> .938			9 <sup>h</sup> 25 <sup>m</sup> 21 <sup>s</sup> .719			9 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .347			10 <sup>h</sup> 21 <sup>m</sup> 4 <sup>s</sup> .831		
+88° 53' 0".29			-85° 19' 57".45			+81° 41' 41".50			-80° 34' 6".83			+82° 58' 54".07		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

7 Octantis. Mag. 6.3			Bradley 1673. Mag. 6.3			2 Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			K Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "
	10 59	-84 8		12 14	+88 8		12 46	-84 40		12 48	+83 51		13 27	-85 21
0.8	53.77	54.27	0.8	12.48	52.77	0.8	7.04	29.18	0.8	24.37	9.31	0.9	14.92	49.99
1.8	53.97	54.33	1.8	13.13	52.53	1.8	7.25	29.10	1.8	24.55	9.02	1.9	15.16	49.86
2.8	54.18	54.38	2.8	13.79	52.31	2.8	7.47	29.02	2.8	24.73	8.74	2.9	15.39	49.71
3.8	54.39	54.42	3.8	14.46	52.12	3.8	7.67	28.93	3.8	24.92	8.48	3.9	15.60	49.57
4.8	54.59	54.45	4.8	15.12	51.94	4.8	7.89	28.83	4.8	25.11	8.24	4.9	15.82	49.41
5.8	54.81	54.47	5.8	15.77	51.77	5.8	8.11	28.71	5.8	25.29	8.03	5.9	16.05	49.24
6.7	55.04	54.50	6.8	16.39	51.61	6.8	8.34	28.60	6.8	25.46	7.83	6.9	16.29	49.07
7.7	55.27	54.55	7.8	16.98	51.45	7.8	8.57	28.49	7.8	25.63	7.62	7.8	16.55	48.90
8.7	55.51	54.63	8.8	17.55	51.31	8.8	8.84	28.38	8.8	25.80	7.43	8.8	16.82	48.74
9.7	55.76	54.71	9.8	18.11	51.16	9.8	9.10	28.29	9.8	25.95	7.22	9.8	17.10	48.59
10.7	56.01	54.80	10.8	18.66	50.99	10.8	9.37	28.22	10.8	26.10	7.02	10.8	17.41	48.45
11.7	56.26	54.92	11.8	19.22	50.82	11.8	9.66	28.18	11.8	26.26	6.81	11.8	17.71	48.34
12.7	56.51	55.07	12.8	19.80	50.63	12.8	9.94	28.16	12.8	26.43	6.58	12.8	18.03	48.25
13.7	56.74	55.24	13.8	20.40	50.45	13.8	10.22	28.16	13.8	26.61	6.34	13.8	18.32	48.19
14.7	56.96	55.40	14.8	21.07	50.26	14.8	10.48	28.17	14.8	26.81	6.10	14.8	18.62	48.13
15.7	57.16	55.55	15.8	21.78	50.08	15.8	10.73	28.19	15.8	27.02	5.87	15.8	18.90	48.08
16.7	57.36	55.71	16.8	22.52	49.92	16.8	10.97	28.21	16.8	27.24	5.65	16.8	19.17	48.04
17.7	57.55	55.86	17.8	23.27	49.79	17.8	11.20	28.21	17.8	27.45	5.45	17.8	19.42	47.99
18.7	57.75	55.98	18.8	24.02	49.69	18.8	11.43	28.19	18.8	27.67	5.27	18.8	19.67	47.93
19.7	57.94	56.10	19.8	24.73	49.60	19.8	11.66	28.16	19.8	27.88	5.12	19.8	19.93	47.85
20.7	58.17	56.24	20.8	25.38	49.52	20.8	11.90	28.14	20.8	28.07	4.99	20.8	20.21	47.75
21.7	58.39	56.38	21.8	26.01	49.46	21.8	12.18	28.12	21.8	28.26	4.88	21.8	20.51	47.66
22.7	58.63	56.55	22.8	26.61	49.39	22.8	12.46	28.10	22.8	28.44	4.76	22.8	20.82	47.59
23.7	58.87	56.74	23.8	27.18	49.31	23.8	12.75	28.11	23.8	28.61	4.63	23.8	21.15	47.54
24.7	59.11	56.96	24.8	27.76	49.22	24.8	13.05	28.15	24.8	28.79	4.48	24.8	21.49	47.51
25.7	59.34	57.18	25.7	28.37	49.12	25.8	13.35	28.22	25.8	28.97	4.32	25.8	21.83	47.50
26.7	59.55	57.42	26.7	29.03	49.01	26.8	13.63	28.30	26.8	29.17	4.15	26.8	22.16	47.51
27.7	59.75	57.66	27.7	29.73	48.91	27.8	13.90	28.38	27.8	29.39	4.00	27.8	22.47	47.55
28.7	59.94	57.89	28.7	30.46	48.82	28.8	14.15	28.47	28.8	29.61	3.85	28.8	22.76	47.58
29.7	60.12	58.12	29.7	31.22	48.76	29.8	14.39	28.55	29.8	29.83	3.72	29.8	23.05	47.60
30.7	60.29	58.33	30.7	31.98	48.72	30.8	14.63	28.64	30.8	30.07	3.62	30.8	23.32	47.62
31.7	60.47	58.53	31.7	32.73	48.70	31.8	14.86	28.71	31.8	30.30	3.53	31.8	23.59	47.62
9.81	-9.76		30.93	+30.91		10.77	-10.73		9.34	+9.28		12.37	-12.33	
10 <sup>h</sup> 59 <sup>m</sup>	55°.280		12 <sup>h</sup> 14 <sup>m</sup>	28°.425		12 <sup>h</sup> 46 <sup>m</sup>	7°.152		12 <sup>h</sup> 48 <sup>m</sup>	30°.418		13 <sup>h</sup> 27 <sup>m</sup>	14°.624	
-84° 8'	50''.60		+88° 9'	36''.08		-84° 40'	22''.34		+83° 51'	50''.47		-85° 21'	42''.23	

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

♄ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			♋ Octantis. Mag. 5.7			♁ Ursæ Minoris. Mag. 4.4			♈ G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "	Dec.	h m	° ' "
	14 13	-83 17		15 2	+87 32		15 24	-84 11		16 54	+82 10		17 16	-80 47
	s	"		s	"		s	"		s	"		s	"
0.9	30.10	29.35	0.9	48.48	44.85	0.9	0.60	38.97	1.0	7.82	27.13	1.0	0.43	13.82
1.9	30.25	29.18	1.9	48.61	44.47	1.9	0.72	38.73	2.0	7.77	26.76	2.0	0.45	13.55
2.9	30.38	28.98	2.9	48.75	44.08	2.9	0.82	38.49	3.0	7.74	26.37	3.0	0.47	13.29
3.9	30.52	28.80	3.9	48.93	43.72	3.9	0.92	38.24	4.0	7.72	25.98	4.0	0.48	13.02
4.9	30.64	28.61	4.9	49.12	43.38	4.9	1.02	37.98	4.9	7.70	25.61	5.0	0.48	12.73
5.9	30.78	28.39	5.9	49.31	43.05	5.9	1.13	37.72	5.9	7.68	25.25	6.0	0.48	12.42
6.9	30.93	28.18	6.9	49.50	42.73	6.9	1.25	37.43	6.9	7.67	24.91	7.0	0.49	12.11
7.9	31.09	27.96	7.9	49.69	42.42	7.9	1.37	37.13	7.9	7.66	24.58	8.0	0.50	11.78
8.9	31.26	27.74	8.9	49.87	42.14	8.9	1.50	36.84	8.9	7.65	24.25	9.0	0.51	11.42
9.9	31.43	27.54	9.9	50.02	41.83	9.9	1.65	36.54	9.9	7.63	23.94	10.0	0.55	11.08
10.9	31.62	27.34	10.9	50.17	41.53	10.9	1.82	36.25	10.9	7.60	23.62	10.9	0.59	10.74
11.9	31.81	27.16	11.9	50.32	41.23	11.9	2.00	35.97	11.9	7.58	23.30	11.9	0.64	10.41
12.9	32.01	27.01	12.9	50.46	40.90	12.9	2.19	35.74	12.9	7.57	22.95	12.9	0.70	10.07
13.9	32.23	26.88	13.9	50.63	40.56	13.9	2.38	35.51	13.9	7.56	22.60	13.9	0.77	9.76
14.9	32.43	26.78	14.9	50.81	40.22	14.9	2.57	35.32	14.9	7.54	22.23	14.9	0.85	9.48
15.9	32.61	26.69	15.9	51.04	39.85	15.9	2.76	35.13	15.9	7.53	21.84	15.9	0.92	9.21
16.9	32.80	26.59	16.9	51.31	39.50	16.9	2.93	34.96	16.9	7.53	21.44	16.9	0.97	8.95
17.9	32.97	26.48	17.9	51.61	39.17	17.9	3.09	34.77	17.9	7.56	21.03	17.9	1.03	8.69
18.9	33.13	26.35	18.9	51.92	38.85	18.9	3.24	34.58	18.9	7.58	20.66	18.9	1.08	8.42
19.8	33.29	26.22	19.9	52.24	38.55	19.9	3.39	34.36	19.9	7.61	20.29	19.9	1.12	8.14
20.8	33.46	26.07	20.9	52.55	38.27	20.9	3.56	34.13	20.9	7.65	19.96	20.9	1.16	7.82
21.8	33.65	25.92	21.9	52.84	38.03	21.9	3.73	33.87	21.9	7.68	19.65	21.9	1.21	7.51
22.8	33.87	25.77	22.9	53.10	37.78	22.9	3.92	33.62	22.9	7.70	19.34	22.9	1.27	7.18
23.8	34.09	25.64	23.9	53.34	37.52	23.9	4.14	33.40	23.9	7.72	19.03	23.9	1.35	6.85
24.8	34.32	25.55	24.9	53.58	37.26	24.9	4.37	33.20	24.9	7.74	18.72	24.9	1.44	6.52
25.8	34.55	25.48	25.9	53.82	37.00	25.9	4.61	33.00	25.9	7.75	18.39	25.9	1.53	6.21
26.8	34.77	25.42	26.9	54.09	36.72	26.9	4.84	32.83	26.9	7.76	18.06	26.9	1.64	5.93
27.8	35.00	25.37	27.9	54.39	36.42	27.9	5.07	32.69	27.9	7.80	17.69	27.9	1.75	5.67
28.8	35.19	25.34	28.9	54.73	36.13	28.9	5.28	32.56	28.9	7.85	17.31	28.9	1.84	5.43
29.8	35.39	25.32	29.9	55.10	35.83	29.9	5.48	32.43	29.9	7.89	16.93	29.9	1.93	5.20
30.8	35.58	25.27	30.9	55.49	35.55	30.9	5.68	32.30	30.9	7.94	16.57	30.9	2.02	4.96
31.8	35.76	25.23	31.9	55.90	35.28	31.9	5.87	32.15	31.9	8.00	16.21	31.9	2.10	4.70
8.56	-8.50		23.34	+23.32		9.88	-9.83		7.34	+7.27		6.24	-6.16	
14 <sup>h</sup> 13 <sup>m</sup> 27 <sup>s</sup> .793			15 <sup>h</sup> 3 <sup>m</sup> 41 <sup>s</sup> .175			15 <sup>h</sup> 23 <sup>m</sup> 56 <sup>s</sup> .594			16 <sup>h</sup> 54 <sup>m</sup> 25 <sup>s</sup> .488			17 <sup>h</sup> 15 <sup>m</sup> 54 <sup>s</sup> .896		
-83° 17' 21".03			+87° 33' 10".52			-84° 11' 30".39			+82° 10' 32".75			-80° 47' 6".56		

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\delta$ Ursæ Minoris. Mag. 4.4			$\chi$ Octantis. Mag. 5.2			$\lambda$ Ursæ Minoris. Mag. 6.6			$\sigma$ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "	Dec.	h m s	° ' "
1.1	17 58	+86 36	1.1	18 6	-87 39	1.1	18 59	+89 1	1.1	19 28	-89 13	1.2	20 48	+82 13
2.1	15.43	57.83	2.1	25.40	58.40	2.1	64.72	20.32	2.1	25.13	32.59	2.2	30.51	64.61
3.0	15.20	57.50	3.1	25.34	58.10	3.1	63.59	20.06	3.1	24.41	32.33	3.2	30.33	64.51
4.0	15.00	57.16	4.1	25.26	57.81	4.1	62.55	19.79	4.1	23.66	32.07	4.2	30.18	64.37
5.0	14.81	56.81	5.1	25.17	57.54	5.1	61.58	19.52	5.1	22.84	31.81	5.2	30.02	64.23
6.0	14.66	56.47	6.0	25.06	57.22	6.0	60.68	19.24	6.0	21.98	31.55	6.2	29.86	64.07
7.0	14.50	56.14	7.0	24.93	56.90	7.0	59.84	18.96	7.0	21.10	31.28	7.2	29.71	63.90
8.0	14.36	55.83	8.0	24.82	56.56	8.0	59.05	18.69	8.0	20.18	31.00	8.2	29.56	63.74
9.0	14.22	55.52	9.0	24.71	56.22	9.0	58.29	18.43	9.0	19.28	30.69	9.2	29.43	63.59
10.0	14.09	55.23	10.0	24.65	55.86	10.0	57.54	18.20	10.0	18.44	30.35	10.2	29.29	63.44
11.0	13.96	54.95	11.0	24.59	55.48	11.0	56.76	17.98	11.0	17.65	30.01	11.2	29.17	63.31
12.0	13.82	54.68	12.0	24.59	55.11	12.0	55.97	17.76	12.0	16.96	29.67	12.2	29.03	63.21
13.0	13.67	54.40	13.0	24.62	54.73	13.0	55.14	17.53	13.0	16.37	29.33	13.2	28.90	63.10
14.0	13.49	54.11	14.0	24.69	54.38	14.0	54.25	17.30	14.0	15.92	28.98	14.2	28.76	62.97
15.0	13.32	53.79	15.0	24.79	54.04	15.0	53.32	17.03	15.0	15.57	28.63	15.2	28.62	62.84
16.0	13.17	53.45	16.0	24.90	53.71	16.0	52.41	16.76	16.0	15.30	28.29	16.2	28.46	62.67
17.0	13.02	53.09	17.0	25.02	53.39	17.0	51.51	16.45	17.0	15.05	27.98	17.2	28.31	62.50
18.0	12.88	52.72	18.0	25.12	53.11	18.0	50.68	16.13	18.0	14.78	27.69	18.2	28.17	62.29
19.0	12.79	52.34	19.0	25.19	52.82	19.0	49.96	15.81	19.0	14.44	27.39	19.2	28.02	62.06
20.0	12.73	51.97	20.0	25.24	52.51	20.0	49.32	15.47	20.0	14.03	27.10	20.2	27.88	61.83
21.0	12.67	51.62	21.0	25.27	52.20	21.0	48.79	15.14	21.0	13.53	26.79	21.2	27.75	61.60
22.0	12.63	51.28	22.0	25.29	51.85	22.0	48.33	14.84	22.0	13.02	26.46	22.2	27.64	61.37
23.0	12.60	51.01	23.0	25.34	51.47	23.0	47.87	14.56	23.0	12.53	26.09	23.2	27.54	61.17
24.0	12.56	50.72	24.0	25.44	51.10	24.0	47.41	14.32	24.0	12.11	25.73	24.2	27.44	60.99
25.0	12.50	50.42	25.0	25.58	50.72	25.0	46.91	14.08	25.0	11.82	25.35	25.2	27.33	60.82
26.0	12.44	50.13	26.0	25.75	50.36	26.0	46.35	13.82	26.0	11.65	24.95	26.2	27.22	60.64
27.0	12.35	49.82	27.0	25.97	50.02	27.0	45.74	13.55	27.0	11.62	24.56	27.2	27.11	60.45
28.0	12.28	49.49	28.0	26.21	49.68	28.0	45.12	13.26	28.0	11.66	24.20	28.2	27.00	60.25
29.0	12.22	49.15	29.0	26.44	49.34	29.0	44.51	12.94	29.0	11.76	23.85	29.2	26.87	60.02
30.0	12.17	48.78	30.0	26.67	49.06	30.0	43.97	12.61	30.0	11.86	23.53	30.2	26.74	59.78
31.0	12.16	48.41	31.0	26.90	48.78	31.0	43.48	12.25	31.0	11.93	23.20	31.2	26.61	59.51
32.0	12.15	48.03	32.0	27.09	48.49	32.0	43.10	11.89	32.0	11.95	22.88	32.2	26.51	59.23
33.0	12.18	47.67	33.0	27.28	48.17	33.0	42.78	11.54	33.0	11.93	22.57	33.2	26.41	58.93
34.0	12.14	47.31	34.0	27.47	47.85	34.0	42.46	11.22	34.0	11.93	22.25	34.2	26.31	58.63
35.0	12.11	46.95	35.0	27.66	47.53	35.0	42.14	10.90	35.0	11.93	21.93	35.2	26.21	58.33
36.0	12.08	46.59	36.0	27.85	47.21	36.0	41.82	10.58	36.0	11.93	21.61	36.2	26.11	58.03
37.0	12.05	46.23	37.0	28.04	46.89	37.0	41.50	10.26	37.0	11.93	21.29	37.2	26.01	57.73
38.0	12.02	45.87	38.0	28.23	46.57	38.0	41.18	9.94	38.0	11.93	20.97	38.2	25.91	57.43
39.0	11.59	45.51	39.0	28.42	46.25	39.0	40.86	9.62	39.0	11.93	20.65	39.2	25.81	57.13
40.0	11.56	45.15	40.0	28.61	45.93	40.0	40.54	9.30	40.0	11.93	20.33	40.2	25.71	56.83
41.0	11.53	44.79	41.0	28.80	45.61	41.0	40.22	8.98	41.0	11.93	20.01	41.2	25.61	56.53
42.0	11.50	44.43	42.0	28.99	45.29	42.0	39.90	8.66	42.0	11.93	19.69	42.2	25.51	56.23
43.0	11.47	44.07	43.0	29.18	44.97	43.0	39.58	8.34	43.0	11.93	19.37	43.2	25.41	55.93
44.0	11.44	43.71	44.0	29.37	44.65	44.0	39.26	8.02	44.0	11.93	19.05	44.2	25.31	55.63
45.0	11.41	43.35	45.0	29.56	44.33	45.0	38.94	7.70	45.0	11.93	18.73	45.2	25.21	55.33
46.0	11.38	42.99	46.0	29.75	44.01	46.0	38.62	7.38	46.0	11.93	18.41	46.2	25.11	55.03
47.0	11.35	42.63	47.0	29.94	43.69	47.0	38.30	7.06	47.0	11.93	18.09	47.2	25.01	54.73
48.0	11.32	42.27	48.0	30.13	43.37	48.0	37.98	6.74	48.0	11.93	17.77	48.2	24.91	54.43
49.0	11.29	41.91	49.0	30.32	43.05	49.0	37.66	6.42	49.0	11.93	17.45	49.2	24.81	54.13
50.0	11.26	41.55	50.0	30.51	42.73	50.0	37.34	6.10	50.0	11.93	17.13	50.2	24.71	53.83
51.0	11.23	41.19	51.0	30.70	42.41	51.0	37.02	5.78	51.0	11.93	16.81	51.2	24.61	53.53
52.0	11.20	40.83	52.0	30.89	42.09	52.0	36.70	5.46	52.0	11.93	16.49	52.2	24.51	53.23
53.0	11.17	40.47	53.0	31.08	41.77	53.0	36.38	5.14	53.0	11.93	16.17	53.2	24.41	52.93
54.0	11.14	40.11	54.0	31.27	41.45	54.0	36.06	4.82	54.0	11.93	15.85	54.2	24.31	52.63
55.0	11.11	39.75	55.0	31.46	41.13	55.0	35.74	4.50	55.0	11.93	15.53	55.2	24.21	52.33
56.0	11.08	39.39	56.0	31.65	40.81	56.0	35.42	4.18	56.0	11.93	15.21	56.2	24.11	52.03
57.0	11.05	39.03	57.0	31.84	40.49	57.0	35.10	3.86	57.0	11.93	14.89	57.2	24.01	51.73
58.0	11.02	38.67	58.0	32.03	40.17	58.0	34.78	3.54	58.0	11.93	14.57	58.2	23.91	51.43
59.0	10.99	38.31	59.0	32.22	39.85	59.0	34.46	3.22	59.0	11.93	14.25	59.2	23.81	51.13
60.0	10.96	37.95	60.0	32.41	39.53	60.0	34.14	2.90	60.0	11.93	13.93	60.2	23.71	50.83
61.0	10.93	37.59	61.0	32.60	39.21	61.0	33.82	2.58	61.0	11.93	13.61	61.2	23.61	50.53
62.0	10.90	37.23	62.0	32.79	38.89	62.0	33.50	2.26	62.0	11.93	13.29	62.2	23.51	50.23
63.0	10.87	36.87	63.0	32.98	38.57	63.0	33.18	1.94	63.0	11.93	12.97	63.2	23.41	49.93
64.0	10.84	36.51	64.0	33.17	38.25	64.0	32.86	1.62	64.0	11.93	12.65	64.2	23.31	49.63
65.0	10.81	36.15	65.0	33.36	37.93	65.0	32.54	1.30	65.0	11.93	12.33	65.2	23.21	49.33
66.0	10.78	35.79	66.0	33.55	37.61	66.0	32.22	0.98	66.0	11.93	12.01	66.2	23.11	49.03
67.0	10.75	35.43	67.0	33.74	37.29	67.0	31.90	0.66	67.0	11.93	11.69	67.2	23.01	48.73
68.0	10.72	35.07	68.0	33.93	36.97	68.0	31.58	0.34	68.0	11.93	11.37	68.2	22.91	48.43
69.0	10.69	34.71	69.0	34.12	36.65	69.0	31.26	0.02	69.0	11.93	11.05	69.2	22.81	48.13
70.0	10.66	34.35	70.0	34.31	36.33	70.0	30.94	-0.30	70.0	11.93	10.73	70.2	22.71	47.83
71.0	10.63	33.99	71.0	34.50	36.01	71.0	30.62	-0.58	71.0	11.93	10.41	71.2	22.61	47.53
72.0	10.60	33.63	72.0	34.69	35.69	72.0	30.30	-0.86	72.0	11.93	10.09	72.2	22.51	47.23
73.0	10.57	33.27	73.0	34.88	35.37	73.0	29.98	-1.14	73.0	11.93	9.77	73.2	22.41	46.93
74.0	10.54	32.91	74.0	35.07	35.05	74.0	29.66	-1.42	74.0	11.93	9.45	74.2	22.31	46.63
75.0	10.51	32.55	75.0	35.26	34.73	75.0	29.34	-1.70	75.0	11.93	9.13	75.2	22.21	46.33
76.0	10.48	32.19	76.0	35.45	34.41	76.0	29.02	-1.98	76.0	11.93	8.81	76.2	22.11	46.03
77.0	10.45	31.83	77.0	35.64	34.09	77.0	28.70	-2.26	77.0	11.93	8.49	77.2	22.01	45.73
78.0	10.42	31.47	78.0	35.83	33.77	78.0	28.38	-2.54						

## CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

$\lambda$ Octantis. Mag. 5.4			$\nu$ Octantis. Mag. 5.7			$\beta$ Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			$\gamma^1$ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.	Wash. Mean Time.	Right Ascen- sion.	Decli- nation.
Dec.	h m	° '	Dec.	h m	° '	Dec.	h m	° '	Dec.	h m	° '	Dec.	h m	° '
	21 38	-83 5		22 16	-86 23		22 37	-81 48		23 27	+86 51		23 47	-82 28
	s	"		s	"		s	"		s	"		s	"
1.2	28.24	65.65	1.2	21.49	24.54	1.2	46.66	58.62	1.3	48.47	43.65	1.3	23.78	42.47
2.2	28.11	65.55	2.2	21.20	24.46	2.2	46.53	58.58	2.3	48.06	43.78	2.3	23.64	42.50
3.2	27.98	65.44	3.2	20.93	24.38	3.2	46.41	58.54	3.3	47.65	43.92	3.3	23.50	42.55
4.2	27.83	65.34	4.2	20.60	24.31	4.2	46.28	58.51	4.3	47.23	44.03	4.3	23.36	42.60
5.2	27.68	65.23	5.2	20.28	24.25	5.2	46.14	58.48	5.3	46.82	44.13	5.3	23.20	42.66
6.2	27.51	65.10	6.2	19.94	24.18	6.2	45.99	58.45	6.3	46.43	44.21	6.3	23.04	42.72
7.2	27.34	64.97	7.2	19.60	24.10	7.2	45.84	58.41	7.3	46.05	44.29	7.3	22.86	42.79
8.2	27.17	64.82	8.2	19.24	24.00	8.2	45.69	58.35	8.3	45.68	44.36	8.3	22.69	42.85
9.2	26.99	64.65	9.2	18.88	23.87	9.2	45.52	58.27	9.3	45.32	44.45	9.3	22.51	42.89
10.2	26.82	64.47	10.2	18.52	23.73	10.2	45.36	58.18	10.3	44.99	44.54	10.3	22.33	42.90
11.2	26.67	64.27	11.2	18.18	23.57	11.2	45.21	58.06	11.3	44.65	44.61	11.3	22.14	42.90
12.2	26.52	64.04	12.2	17.84	23.39	12.2	45.06	57.93	12.3	44.32	44.72	12.3	21.97	42.86
13.2	26.39	63.81	13.2	17.52	23.20	13.2	44.91	57.77	13.3	43.94	44.83	13.3	21.80	42.82
14.2	26.26	63.57	14.2	17.24	23.02	14.2	44.79	57.62	14.2	43.55	44.94	14.3	21.64	42.76
15.2	26.15	63.35	15.2	16.99	22.82	15.2	44.68	57.47	15.2	43.14	45.04	15.3	21.50	42.68
16.2	26.05	63.13	16.2	16.74	22.61	16.2	44.58	57.30	16.2	42.72	45.14	16.3	21.36	42.62
17.2	25.95	62.93	17.2	16.49	22.43	17.2	44.46	57.15	17.2	42.27	45.20	17.3	21.22	42.56
18.2	25.83	62.74	18.2	16.22	22.29	18.2	44.34	57.04	18.2	41.81	45.23	18.2	21.08	42.52
19.2	25.71	62.56	19.2	15.96	22.14	19.2	44.22	56.94	19.2	41.38	45.24	19.2	20.93	42.49
20.2	25.58	62.37	20.2	15.64	21.97	20.2	44.09	56.82	20.2	40.98	45.24	20.2	20.76	42.47
21.2	25.44	62.16	21.2	15.32	21.80	21.2	43.96	56.69	21.2	40.60	45.22	21.2	20.59	42.43
22.2	25.30	61.93	22.2	15.02	21.61	22.2	43.80	56.55	22.2	40.23	45.21	22.2	20.41	42.39
23.1	25.15	61.67	23.2	14.69	21.40	23.2	43.65	56.37	23.2	39.90	45.23	23.2	20.23	42.32
24.1	25.01	61.39	24.2	14.38	21.15	24.2	43.51	56.16	24.2	39.57	45.24	24.2	20.05	42.23
25.1	24.90	61.10	25.2	14.09	20.88	25.2	43.38	55.93	25.2	39.23	45.27	25.2	19.87	42.11
26.1	24.79	60.80	26.2	13.82	20.61	26.2	43.26	55.70	26.2	38.86	45.31	26.2	19.71	41.97
27.1	24.70	60.51	27.2	13.59	20.35	27.2	43.16	55.46	27.2	38.46	45.34	27.2	19.57	41.83
28.1	24.62	60.23	28.2	13.37	20.10	28.2	43.05	55.23	28.2	38.05	45.35	28.2	19.42	41.69
29.1	24.55	59.96	29.2	13.16	19.85	29.2	42.96	55.04	29.2	37.63	45.34	29.2	19.28	41.56
30.1	24.47	59.70	30.2	12.96	19.61	30.2	42.87	54.83	30.2	37.20	45.30	30.2	19.15	41.43
31.1	24.38	59.45	31.2	12.74	19.39	31.2	42.76	54.63	31.2	36.77	45.25	31.2	19.01	41.31
32.1	24.30	59.20	32.1	12.52	19.16	32.2	42.66	54.45	32.2	36.35	45.19	32.2	18.87	41.19
8.32	-8.26		15.88	-15.85		7.02	-6.95		18.27	+18.24		7.64	-7.57	
21 <sup>h</sup> 38 <sup>m</sup>	19 <sup>s</sup> .542		22 <sup>h</sup> 16 <sup>m</sup>	8 <sup>s</sup> .656		22 <sup>h</sup> 37 <sup>m</sup>	39 <sup>s</sup> .016		23 <sup>h</sup> 27 <sup>m</sup>	44 <sup>s</sup> .125		23 <sup>h</sup> 47 <sup>m</sup>	16 <sup>s</sup> .424	
-83° 6'	6''.99		-86° 23'	27''.13		-81° 49'	2''.34		+86° 50'	58''.89		-82° 28'	48''.42	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	33 Piscium. Mag. 4.7		$\alpha$ Andromedæ. (Alpheratz.) Mag. 2.2		$\beta$ Cassiopeiæ. Mag. 2.4		$\epsilon$ Phœnicis. Mag. 3.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m ° ' "	° ' "	h m ° ' "	° ' "	h m ° ' "	° ' "	h m ° ' "	° ' "
	0 1	- 6 9	0 4	+28 37	0 4	+58 41	0 5	-46 11
	s	"	s	"	s	"	s	"
Jan. 0.2	6.069	75.78	6.334	71.04	44.786	54.43	13.007	88.69
10.2	5.967 <sup>102</sup>	76.33	6.201 <sup>133</sup>	70.13	44.485 <sup>301</sup>	53.69	12.808 <sup>199</sup>	88.30
20.2	5.871 <sup>96</sup>	76.76	6.075 <sup>126</sup>	68.96	44.198 <sup>287</sup>	52.44 <sup>125</sup>	12.625 <sup>183</sup>	87.45
30.1	5.787 <sup>84</sup>	77.06	5.962 <sup>113</sup>	67.58	43.935 <sup>138</sup>	50.73 <sup>171</sup>	12.465 <sup>160</sup>	86.16
Feb. 9.1	5.721 <sup>66</sup>	77.21	5.866 <sup>96</sup>	66.06	43.709 <sup>226</sup>	48.62 <sup>211</sup>	12.330 <sup>135</sup>	84.46
	47	3	70	160	178	241	100	206
19.1	5.674	77.18	5.796	64.46	43.531	46.21	12.230	82.40
Mar. 1.1	5.653	76.95	5.757	62.84	43.415	43.59	12.166	80.03
11.0	5.662	76.52	5.753	61.30	43.366	40.89	12.145	77.39
21.0	5.704	75.84	5.793	59.90	43.392	38.21	12.170	74.53
31.0	5.783 <sup>79</sup>	74.94	5.877 <sup>84</sup>	58.73	43.499 <sup>107</sup>	35.67 <sup>254</sup>	12.244 <sup>74</sup>	71.51
	118	115	130	90	186	231	125	311
Apr. 10.0	5.901	73.79	6.007	57.83	43.685	33.36	12.369	68.40
19.9	6.059 <sup>158</sup>	72.41	6.184 <sup>177</sup>	57.27	43.947 <sup>262</sup>	31.40 <sup>196</sup>	12.546 <sup>177</sup>	65.25
29.9	6.255 <sup>196</sup>	70.82	6.405 <sup>221</sup>	57.08	44.280 <sup>333</sup>	29.84 <sup>156</sup>	12.773 <sup>227</sup>	62.13
May 9.9	6.485 <sup>230</sup>	69.05	6.666 <sup>261</sup>	57.27	44.675 <sup>395</sup>	28.74 <sup>110</sup>	13.047 <sup>274</sup>	59.12
19.8	6.747 <sup>262</sup>	67.12	6.961 <sup>295</sup>	57.86	45.121 <sup>446</sup>	28.15 <sup>59</sup>	13.364 <sup>317</sup>	56.26
	286	203	321	97	486	6	352	262
29.8	7.033	65.09	7.282	58.83	45.607	28.09	13.716	53.64
June 8.8	7.338 <sup>305</sup>	63.00	7.621 <sup>339</sup>	60.16	46.117 <sup>510</sup>	28.57 <sup>48</sup>	14.094 <sup>378</sup>	51.29
18.8	7.654 <sup>316</sup>	60.91	7.970 <sup>349</sup>	61.81	46.640 <sup>523</sup>	29.56 <sup>99</sup>	14.492 <sup>398</sup>	49.31
28.7	7.972 <sup>318</sup>	58.86	8.319 <sup>349</sup>	63.74	47.160 <sup>520</sup>	31.03 <sup>147</sup>	14.896 <sup>404</sup>	47.71
July 8.7	8.283 <sup>311</sup>	56.91	8.660 <sup>341</sup>	65.91	47.666 <sup>506</sup>	32.96 <sup>193</sup>	15.296 <sup>400</sup>	46.56
	298	179	325	234	477	232	388	69
18.7	8.581	55.12	8.985	68.25	48.143	35.28	15.684	45.87
28.7	8.859 <sup>278</sup>	53.52	9.285 <sup>300</sup>	70.71	48.582 <sup>439</sup>	37.95 <sup>267</sup>	16.046 <sup>362</sup>	45.65
Aug. 7.6	9.108 <sup>249</sup>	52.14	9.554 <sup>269</sup>	73.22	48.975 <sup>393</sup>	40.91 <sup>296</sup>	16.375 <sup>329</sup>	45.92
17.6	9.325 <sup>217</sup>	51.03	9.789 <sup>235</sup>	75.75	49.313 <sup>338</sup>	44.08 <sup>317</sup>	16.661 <sup>286</sup>	46.65
27.6	9.505 <sup>180</sup>	50.18	9.984 <sup>195</sup>	78.23	49.592 <sup>279</sup>	47.40 <sup>332</sup>	16.898 <sup>237</sup>	47.81
	143	56	154	239	217	341	182	155
Sept. 6.5	9.648	49.62	10.138	80.62	49.809	50.81	17.080	49.36
16.5	9.751 <sup>103</sup>	49.32	10.251 <sup>113</sup>	82.87	49.962 <sup>153</sup>	54.23 <sup>342</sup>	17.206 <sup>126</sup>	51.22
26.5	9.816 <sup>65</sup>	49.27	10.323 <sup>72</sup>	84.94	50.050 <sup>88</sup>	57.60 <sup>337</sup>	17.274 <sup>68</sup>	53.34
Oct. 6.5	9.844 <sup>28</sup>	49.46	10.357 <sup>34</sup>	86.81	50.076 <sup>26</sup>	60.85 <sup>325</sup>	17.286 <sup>12</sup>	55.60
16.4	9.841 <sup>3</sup>	49.83	10.357 <sup>0</sup>	88.44	50.044 <sup>32</sup>	63.90 <sup>305</sup>	17.246 <sup>40</sup>	57.93
	34	54	33	138	88	280	88	229
26.4	9.807	50.37	10.324	89.82	49.956	66.70	17.158	60.22
Nov. 5.4	9.750 <sup>57</sup>	51.02	10.264 <sup>60</sup>	90.91	49.816 <sup>140</sup>	69.18 <sup>248</sup>	17.029 <sup>129</sup>	62.37
15.4	9.672 <sup>78</sup>	51.77	10.182 <sup>82</sup>	91.71	49.631 <sup>185</sup>	71.28 <sup>210</sup>	16.866 <sup>163</sup>	64.31
25.3	9.581 <sup>91</sup>	52.54	10.080 <sup>102</sup>	92.22	49.406 <sup>225</sup>	72.94 <sup>166</sup>	16.681 <sup>185</sup>	65.93
Dec. 5.3	9.479 <sup>102</sup>	53.32	9.962 <sup>118</sup>	92.39	49.148 <sup>258</sup>	74.13 <sup>119</sup>	16.478 <sup>203</sup>	67.19
	107	76	128	15	282	66	213	84
15.3	9.372	54.08	9.834	92.24	48.866	74.79	16.265	68.03
25.2	9.262 <sup>110</sup>	54.77	9.700 <sup>134</sup>	91.79	48.568 <sup>298</sup>	74.91 <sup>12</sup>	16.051 <sup>214</sup>	68.42
35.2	9.155 <sup>107</sup>	55.40	9.563 <sup>137</sup>	91.03	48.264 <sup>304</sup>	74.49 <sup>42</sup>	15.843 <sup>208</sup>	68.33
Mean Place	5.255	78.77	5.642	55.99	44.428	31.28	12.088	79.72
Sec $\delta$ , Tan $\delta$	1.006	-0.108	1.140	+0.546	1.925	+1.645	1.445	-1.043
$D\phi\alpha$ , $D\omega\alpha$	+0.06	+0.01	+0.06	-0.04	+0.06	-0.11	+0.06	+0.07
$D\phi\delta$ , $D\omega\delta$	+0.4	0.0	+0.4	0.0	+0.4	0.0	+0.4	0.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	22 Andromedæ. Mag. 5.1		γ Pegasi. Mag. 2.9		σ Andromedæ. Mag. 4.5		ι Ceti. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 5	° ' " +45 36	h m 0 8	° ' " +14 43	h m 0 13	° ' " +36 19	h m 0 15	° ' " - 9 16
	s	"	s	"	s	"	s	"
Jan. 0.2	60.691	57.54	58.387	30.29	59.976	47.92	12.861	60.13
10.2	60.496 <sup>195</sup>	56.69 <sup>85</sup>	58.276 <sup>111</sup>	29.48 <sup>81</sup>	59.820 <sup>156</sup>	47.10 <sup>82</sup>	12.753 <sup>108</sup>	60.65 <sup>52</sup>
20.2	60.308 <sup>188</sup>	55.43 <sup>126</sup>	58.170 <sup>106</sup>	28.55 <sup>93</sup>	59.669 <sup>151</sup>	45.94 <sup>116</sup>	12.650 <sup>103</sup>	61.03 <sup>38</sup>
30.2	60.138 <sup>170</sup>	53.80 <sup>163</sup>	58.074 <sup>96</sup>	27.55 <sup>100</sup>	59.529 <sup>140</sup>	44.50 <sup>144</sup>	12.556 <sup>94</sup>	61.23 <sup>20</sup>
Feb. 9.1	59.991 <sup>147</sup>	51.89 <sup>191</sup>	57.993 <sup>81</sup>	26.53 <sup>102</sup>	59.409 <sup>120</sup>	42.83 <sup>167</sup>	12.477 <sup>79</sup>	61.26 <sup>3</sup>
	113	214	59	101	94	182	60	18
19.1	59.878 <sup>71</sup>	49.75 <sup>226</sup>	57.934 <sup>33</sup>	25.52 <sup>92</sup>	59.315 <sup>60</sup>	41.01 <sup>189</sup>	12.417 <sup>35</sup>	61.08 <sup>38</sup>
Mar. 1.1	59.807 <sup>22</sup>	47.49 <sup>227</sup>	57.901 <sup>2</sup>	24.60 <sup>80</sup>	59.255 <sup>20</sup>	39.12 <sup>187</sup>	12.382 <sup>7</sup>	60.70 <sup>62</sup>
11.0	59.785 <sup>32</sup>	45.22 <sup>220</sup>	57.899 <sup>35</sup>	23.80 <sup>60</sup>	59.235 <sup>26</sup>	37.25 <sup>178</sup>	12.375 <sup>27</sup>	60.08 <sup>84</sup>
21.0	59.817 <sup>90</sup>	43.02 <sup>202</sup>	57.934 <sup>75</sup>	23.20 <sup>38</sup>	59.261 <sup>75</sup>	35.47 <sup>158</sup>	12.402 <sup>64</sup>	59.24 <sup>109</sup>
31.0	59.907 <sup>148</sup>	41.00 <sup>175</sup>	58.009 <sup>117</sup>	22.82 <sup>10</sup>	59.336 <sup>126</sup>	33.89 <sup>133</sup>	12.466 <sup>104</sup>	58.15 <sup>131</sup>
Apr. 10.0	60.055 <sup>207</sup>	39.25 <sup>143</sup>	58.126 <sup>159</sup>	22.72 <sup>20</sup>	59.462 <sup>177</sup>	32.56 <sup>100</sup>	12.570 <sup>143</sup>	56.84 <sup>155</sup>
19.9	60.262 <sup>261</sup>	37.82 <sup>102</sup>	58.285 <sup>199</sup>	22.92 <sup>51</sup>	59.639 <sup>226</sup>	31.56 <sup>63</sup>	12.713 <sup>184</sup>	55.29 <sup>173</sup>
29.9	60.523 <sup>309</sup>	36.80 <sup>58</sup>	58.484 <sup>235</sup>	23.43 <sup>83</sup>	59.865 <sup>270</sup>	30.93 <sup>22</sup>	12.897 <sup>221</sup>	53.56 <sup>191</sup>
May 9.9	60.832 <sup>350</sup>	36.22 <sup>11</sup>	58.719 <sup>269</sup>	24.26 <sup>114</sup>	60.135 <sup>308</sup>	30.71 <sup>20</sup>	13.118 <sup>253</sup>	51.65 <sup>203</sup>
19.8	61.182 <sup>380</sup>	36.11 <sup>37</sup>	58.988 <sup>296</sup>	25.40 <sup>141</sup>	60.443 <sup>339</sup>	30.91 <sup>63</sup>	13.371 <sup>280</sup>	49.62 <sup>212</sup>
29.8	61.562 <sup>403</sup>	36.48 <sup>84</sup>	59.284 <sup>313</sup>	26.81 <sup>166</sup>	60.782 <sup>359</sup>	31.54 <sup>104</sup>	13.651 <sup>302</sup>	47.50 <sup>215</sup>
June 8.8	61.965 <sup>413</sup>	37.32 <sup>129</sup>	59.597 <sup>324</sup>	28.47 <sup>187</sup>	61.141 <sup>370</sup>	32.58 <sup>141</sup>	13.953 <sup>314</sup>	45.35 <sup>212</sup>
18.8	62.378 <sup>413</sup>	38.61 <sup>171</sup>	59.921 <sup>326</sup>	30.34 <sup>202</sup>	61.511 <sup>373</sup>	33.99 <sup>177</sup>	14.267 <sup>319</sup>	43.23 <sup>206</sup>
28.7	62.791 <sup>402</sup>	40.32 <sup>206</sup>	60.247 <sup>320</sup>	32.36 <sup>213</sup>	61.884 <sup>366</sup>	35.76 <sup>207</sup>	14.586 <sup>315</sup>	41.17 <sup>192</sup>
July 8.7	63.193 <sup>382</sup>	42.38 <sup>237</sup>	60.567 <sup>306</sup>	34.49 <sup>217</sup>	62.250 <sup>348</sup>	37.83 <sup>230</sup>	14.901 <sup>303</sup>	39.25 <sup>175</sup>
18.7	63.575 <sup>352</sup>	44.75 <sup>265</sup>	60.873 <sup>285</sup>	36.66 <sup>217</sup>	62.598 <sup>325</sup>	40.13 <sup>250</sup>	15.204 <sup>286</sup>	37.50 <sup>152</sup>
28.7	63.927 <sup>315</sup>	47.40 <sup>283</sup>	61.158 <sup>256</sup>	38.83 <sup>211</sup>	62.923 <sup>293</sup>	42.63 <sup>264</sup>	15.490 <sup>259</sup>	35.98 <sup>127</sup>
Aug. 7.6	64.242 <sup>273</sup>	50.23 <sup>296</sup>	61.414 <sup>225</sup>	40.94 <sup>202</sup>	63.216 <sup>257</sup>	45.27 <sup>271</sup>	15.749 <sup>229</sup>	34.71 <sup>100</sup>
17.6	64.515 <sup>227</sup>	53.19 <sup>305</sup>	61.639 <sup>189</sup>	42.96 <sup>188</sup>	63.473 <sup>216</sup>	47.98 <sup>272</sup>	15.978 <sup>193</sup>	33.71 <sup>69</sup>
27.6	64.742 <sup>179</sup>	56.24 <sup>304</sup>	61.828 <sup>151</sup>	44.84 <sup>170</sup>	63.689 <sup>174</sup>	50.70 <sup>269</sup>	16.171 <sup>155</sup>	33.02 <sup>40</sup>
Sept. 6.5	64.921 <sup>129</sup>	59.28 <sup>300</sup>	61.979 <sup>113</sup>	46.54 <sup>151</sup>	63.863 <sup>130</sup>	53.39 <sup>259</sup>	16.326 <sup>117</sup>	32.62 <sup>11</sup>
16.5	65.050 <sup>80</sup>	62.28 <sup>289</sup>	62.092 <sup>74</sup>	48.05 <sup>130</sup>	63.993 <sup>87</sup>	55.98 <sup>246</sup>	16.443 <sup>78</sup>	32.51 <sup>15</sup>
26.5	65.130 <sup>33</sup>	65.17 <sup>273</sup>	62.166 <sup>40</sup>	49.35 <sup>107</sup>	64.080 <sup>47</sup>	58.44 <sup>228</sup>	16.521 <sup>42</sup>	32.66 <sup>38</sup>
Oct. 6.5	65.163 <sup>10</sup>	67.90 <sup>251</sup>	62.206 <sup>7</sup>	50.42 <sup>85</sup>	64.127 <sup>7</sup>	60.72 <sup>206</sup>	16.563 <sup>8</sup>	33.04 <sup>58</sup>
16.4	65.153 <sup>50</sup>	70.41 <sup>224</sup>	62.213 <sup>23</sup>	51.27 <sup>60</sup>	64.134 <sup>28</sup>	62.78 <sup>181</sup>	16.571 <sup>23</sup>	33.62 <sup>74</sup>
26.4	65.103 <sup>87</sup>	72.65 <sup>193</sup>	62.190 <sup>46</sup>	51.87 <sup>40</sup>	64.106 <sup>59</sup>	64.59 <sup>152</sup>	16.548 <sup>47</sup>	34.36 <sup>84</sup>
Nov. 5.4	65.016 <sup>119</sup>	74.58 <sup>158</sup>	62.144 <sup>69</sup>	52.27 <sup>16</sup>	64.047 <sup>86</sup>	66.11 <sup>130</sup>	16.501 <sup>69</sup>	35.20 <sup>90</sup>
15.4	64.897 <sup>146</sup>	76.16 <sup>118</sup>	62.075 <sup>85</sup>	52.43 <sup>3</sup>	63.961 <sup>110</sup>	67.31 <sup>85</sup>	16.432 <sup>86</sup>	36.10 <sup>92</sup>
25.3	64.751 <sup>167</sup>	77.34 <sup>77</sup>	61.990 <sup>97</sup>	52.40 <sup>24</sup>	63.851 <sup>128</sup>	68.16 <sup>51</sup>	16.346 <sup>98</sup>	37.02 <sup>89</sup>
Dec. 5.3	64.584 <sup>183</sup>	78.11 <sup>31</sup>	61.893 <sup>108</sup>	52.16 <sup>43</sup>	63.723 <sup>144</sup>	68.67 <sup>12</sup>	16.248 <sup>107</sup>	37.91 <sup>83</sup>
15.3	64.401 <sup>195</sup>	78.42 <sup>15</sup>	61.785 <sup>113</sup>	51.73 <sup>60</sup>	63.579 <sup>153</sup>	68.79 <sup>26</sup>	16.141 <sup>111</sup>	38.74 <sup>74</sup>
25.2	64.206 <sup>199</sup>	78.27 <sup>59</sup>	61.672 <sup>115</sup>	51.13 <sup>76</sup>	63.426 <sup>159</sup>	68.53 <sup>63</sup>	16.030 <sup>113</sup>	39.48 <sup>62</sup>
35.2	64.007	77.68	61.557	50.37	63.267	67.90	15.917	40.10
Mean Place	60.119	37.45	57.593	19.85	59.251	30.33	11.958	62.18
Sec δ, Tan δ	1.430	+1.022	1.034	+0.263	1.241	+0.735	1.013	-0.163
Dφ α, Dω α	+0.06	-0.07	+0.06	-0.02	+0.06	-0.05	+0.06	+0.01
Dφ δ, Dω δ	+0.4	0.0	+0.4	0.0	+0.4	+0.1	+0.4	+0.1



**FOR THE UPPER TRANSIT AT WASHINGTON.**

Washington Mean Time.	ζ Tucanæ. Mag. 4.3		44 Piscium. Mag. 6.0		β Hydri. Mag. 2.9		α Phœnicis. Mag. 2.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 15	° ' " -65 21	h m 0 21	° ' " + 1 28	h m 0 21	° ' " -77 42	h m 0 22	° ' " -42 44
	s "	s "	s "	s "	s "	s "	s "	s "
Jan. 0.2	46.52	56.29	9.746	54.08	25.85	91.51	12.136	92.28
10.2	46.12	55.45	9.640	53.41	24.94	90.45	11.948	92.16
20.2	45.74	54.05	9.537	52.77	24.08	88.79	11.769	91.58
30.2	45.40	52.14	9.443	52.19	23.30	86.60	11.608	90.57
Feb. 9.1	45.10	49.76	9.361	51.70	22.64	83.93	11.467	89.16
19.1	44.88	46.98	9.298	51.34	22.08	80.86	11.355	87.37
Mar. 1.1	44.71	43.86	9.257	51.12	21.66	77.47	11.276	85.24
11.0	44.61	40.49	9.247	51.12	21.38	73.84	11.235	82.82
21.0	44.58	36.92	9.270	51.31	21.25	70.05	11.237	80.14
31.0	44.64	33.25	9.330	51.73	21.28	66.20	11.285	77.29
Apr. 10.0	44.78	29.55	9.429	52.42	21.47	62.35	11.384	74.30
19.9	45.01	25.88	9.568	53.34	21.80	58.59	11.532	71.22
29.9	45.30	22.35	9.749	54.53	22.28	55.01	11.730	68.14
May 9.9	45.68	19.01	9.967	55.95	22.91	51.67	11.975	65.12
19.9	46.12	15.95	10.218	57.58	23.67	48.66	12.263	62.20
29.8	46.62	13.22	10.496	59.38	24.53	46.03	12.586	59.48
June 8.8	47.17	10.88	10.795	61.31	25.49	43.85	12.940	57.01
18.8	47.75	9.02	11.107	63.33	26.51	42.16	13.314	54.85
28.7	48.34	7.65	11.424	65.38	27.57	41.01	13.698	53.05
July 8.7	48.94	6.81	11.738	67.41	28.65	40.42	14.083	51.66
18.7	49.53	6.52	12.041	69.37	29.70	40.42	14.458	50.72
28.7	50.09	6.78	12.327	71.20	30.71	40.98	14.812	50.25
Aug. 7.6	50.59	7.59	12.586	72.87	31.64	42.10	15.139	50.27
17.6	51.04	8.92	12.817	74.34	32.46	43.74	15.427	50.73
27.6	51.42	10.71	13.013	75.57	33.14	45.84	15.672	51.66
Sept. 6.6	51.71	12.90	13.173	76.57	33.67	48.34	15.867	52.99
16.5	51.90	15.41	13.295	77.32	34.03	51.12	16.010	54.67
26.5	52.00	18.14	13.380	77.81	34.19	54.11	16.099	56.63
Oct. 6.5	52.01	20.98	13.431	78.06	34.18	57.19	16.137	58.80
16.4	51.92	23.83	13.448	78.11	33.96	60.22	16.124	61.06
26.4	51.75	26.57	13.436	77.97	33.58	63.10	16.066	63.33
Nov. 5.4	51.49	29.06	13.399	77.65	33.04	65.70	15.969	65.53
15.4	51.18	31.22	13.341	77.21	32.34	67.91	15.837	67.54
25.3	50.82	32.97	13.264	76.66	31.55	69.65	15.679	69.30
Dec. 5.3	50.42	34.23	13.174	76.04	30.67	70.84	15.502	70.73
15.3	49.99	34.94	13.074	75.36	29.73	71.43	15.312	71.77
25.3	49.56	35.07	12.968	74.65	28.78	71.39	15.116	72.40
35.2	49.14	34.60	12.859	73.94	27.84	70.73	14.921	72.58
Mean Place	45.483	43.94	8.836	48.19	24.623	78.09	11.117	84.20
Sec δ, Tan δ	2.398	-2.180	1.000	+0.026	4.701	-4.593	1.362	-0.924
Dψ α, Dα α	+0.06	+0.15	+0.06	0.00	+0.05	+0.31	+0.06	+0.06
Dψ δ, Dα δ	+0.4	+0.1	+0.4	+0.1	+0.4	+0.1	+0.4	+0.1

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	12 Ceti. Mag. 6.0		13 Ceti. Mag. 5.2		ζ Cassiopeiae. Mag. 3.7		π Andromedae. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 25	° ' " — 4 24	h m 0 30	° ' " — 4 2	h m 0 32	° ' " +53 26	h m 0 32	° ' " +33 15
	s	"	s	"	s	"	s	"
Jan. 0.2	49.149	52.80	59.497	54.33	21.192	47.51	27.519	62.36
10.2	49.041 <sup>108</sup>	53.42 62	59.389 <sup>108</sup>	54.95 62	20.942 <sup>250</sup>	47.02 49	27.371 <sup>148</sup>	61.66 70
20.2	48.936 <sup>105</sup>	53.93 51	59.283 <sup>106</sup>	55.48 53	20.693 <sup>249</sup>	46.05 97	27.224 <sup>147</sup>	60.67 99
30.2	48.838 <sup>98</sup>	54.32 39	59.184 <sup>99</sup>	55.89 41	20.456 <sup>237</sup>	44.64 141	27.083 <sup>141</sup>	59.40 127
Feb. 9.1	48.752 <sup>86</sup>	54.56 24	59.096 <sup>88</sup>	56.14 25	20.244 <sup>212</sup>	42.84 180	26.958 <sup>125</sup>	57.93 147
	67	8	70	10	177	211	104	163
19.1	48.685	54.64 45	59.026	56.24 49	20.067	40.73 132	26.854	56.30 73
Mar. 1.1	48.640 <sup>16</sup>	54.53 11	58.977 <sup>19</sup>	56.15 9	19.935 <sup>77</sup>	38.40 233	26.781 <sup>37</sup>	54.60 170
11.1	48.624 <sup>18</sup>	54.21 32	58.958 <sup>13</sup>	55.85 30	19.858 <sup>52</sup>	35.96 244	26.744 <sup>5</sup>	52.91 169
21.0	48.642 <sup>54</sup>	53.67 79	58.971 <sup>49</sup>	55.33 77	19.845 <sup>56</sup>	33.50 246	26.749 <sup>54</sup>	51.31 160
31.0	48.696 <sup>93</sup>	52.88 102	59.020 <sup>89</sup>	54.56 99	19.901 <sup>125</sup>	31.13 217	26.803 <sup>103</sup>	49.87 120
Apr. 10.0	48.789 <sup>135</sup>	51.86 127	59.109 <sup>130</sup>	53.57 124	20.026 <sup>196</sup>	28.96 190	26.906 <sup>153</sup>	48.67 92
19.9	48.924 <sup>174</sup>	50.59 149	59.239 <sup>171</sup>	52.33 146	20.222 <sup>263</sup>	27.06 154	27.059 <sup>203</sup>	47.75 56
29.9	49.098 <sup>213</sup>	49.10 169	59.410 <sup>209</sup>	50.87 167	20.485 <sup>322</sup>	25.52 111	27.262 <sup>248</sup>	47.19 18
May 9.9	49.311 <sup>247</sup>	47.41 185	59.619 <sup>243</sup>	49.20 183	20.807 <sup>376</sup>	24.41 66	27.510 <sup>286</sup>	47.01 20
19.9	49.558 <sup>273</sup>	45.56 199	59.862 <sup>272</sup>	47.37 197	21.183 <sup>418</sup>	23.75 17	27.796 <sup>320</sup>	47.21 60
29.8	49.831 <sup>297</sup>	43.57 206	60.134 <sup>294</sup>	45.40 205	21.601 <sup>447</sup>	23.58 31	28.116 <sup>344</sup>	47.81 98
June 8.8	50.128 <sup>311</sup>	41.51 209	60.428 <sup>311</sup>	43.35 208	22.043 <sup>466</sup>	23.89 80	28.460 <sup>359</sup>	48.79 134
18.8	50.439 <sup>317</sup>	39.42 206	60.739 <sup>316</sup>	41.27 207	22.514 <sup>472</sup>	24.69 127	28.819 <sup>364</sup>	50.13 167
28.8	50.756 <sup>315</sup>	37.36 199	61.055 <sup>316</sup>	39.20 199	22.986 <sup>466</sup>	25.96 169	29.183 <sup>361</sup>	51.80 194
July 8.7	51.071 <sup>304</sup>	35.37 186	61.371 <sup>306</sup>	37.21 187	23.452 <sup>449</sup>	27.65 208	29.544 <sup>348</sup>	53.74 217
18.7	51.375 <sup>288</sup>	33.51 168	61.677 <sup>291</sup>	35.34 169	23.901 <sup>422</sup>	29.73 240	29.892 <sup>328</sup>	55.91 235
28.7	51.663 <sup>263</sup>	31.83 147	61.968 <sup>266</sup>	33.65 148	24.323 <sup>386</sup>	32.13 269	30.220 <sup>301</sup>	58.26 246
Aug. 7.6	51.926 <sup>235</sup>	30.36 122	62.234 <sup>239</sup>	32.17 124	24.709 <sup>343</sup>	34.82 291	30.521 <sup>267</sup>	60.72 252
17.6	52.161 <sup>164</sup>	29.14 67	62.473 <sup>170</sup>	30.93 70	25.052 <sup>295</sup>	37.73 315	30.788 <sup>191</sup>	63.24 250
27.6	52.361 <sup>126</sup>	28.18 41	62.678 <sup>132</sup>	29.95 43	25.347 <sup>187</sup>	40.80 318	31.020 <sup>150</sup>	65.78 241
Sept. 6.6	52.525 <sup>90</sup>	27.51 13	62.848 <sup>95</sup>	29.25 15	25.589 <sup>134</sup>	43.95 315	31.211 <sup>109</sup>	68.28 229
16.5	52.651 <sup>53</sup>	27.10 9	62.980 <sup>60</sup>	28.82 8	25.776 <sup>79</sup>	47.13 304	31.361 <sup>70</sup>	70.69 210
26.5	52.741 <sup>20</sup>	26.97 32	63.075 <sup>26</sup>	28.67 30	25.910 <sup>27</sup>	50.28 290	31.470 <sup>32</sup>	72.98 192
Oct. 6.5	52.794 <sup>9</sup>	27.06 49	63.135 <sup>3</sup>	28.75 47	25.989 <sup>22</sup>	53.32 268	31.540 <sup>1</sup>	75.08 167
16.5	52.814	27.38	63.161	29.05	26.016	56.22	31.572	77.00
26.4	52.805	27.87	63.158	29.52	25.994	58.90	31.571	78.67
Nov. 5.4	52.769 <sup>36</sup>	28.49 62	63.127 <sup>31</sup>	30.13 61	25.924 <sup>70</sup>	61.31 241	31.537 <sup>34</sup>	80.10 143
15.4	52.712 <sup>57</sup>	29.21 72	63.074 <sup>53</sup>	30.86 73	25.811 <sup>113</sup>	63.39 208	31.475 <sup>62</sup>	81.23 113
25.3	52.636 <sup>76</sup>	29.98 77	63.002 <sup>72</sup>	31.63 77	25.659 <sup>152</sup>	65.08 169	31.388 <sup>87</sup>	82.05 82
Dec. 5.3	52.546 <sup>90</sup>	30.78 80	62.916 <sup>86</sup>	32.43 80	25.475 <sup>184</sup>	66.35 127	31.281 <sup>107</sup>	82.55 50
	100	79	98	79	215	80	126	16
15.3	52.446 <sup>108</sup>	31.57 75	62.818 <sup>106</sup>	33.22 76	25.260 <sup>235</sup>	67.15 30	31.155 <sup>140</sup>	82.71 18
25.3	52.338 <sup>111</sup>	32.32 67	62.712 <sup>110</sup>	33.98 69	25.025 <sup>249</sup>	67.45 19	31.015 <sup>147</sup>	82.53 51
35.2	52.227	32.99	62.602	34.67	24.776	67.26	30.868	82.02
Mean Place	48.196	56.65	58.516	58.34	20.390	25.07	26.620	45.46
Sec δ, Tan δ	1.003	-0.077	1.002	-0.071	1.679	+1.349	1.196	+0.656
Dψ α, Dω α	+0.06	+0.01	+0.06	0.00	+0.07	-0.09	+0.06	-0.04
Dψ δ, Dω δ	+0.4	+0.1	+0.4	+0.1	+0.4	+0.1	+0.4	+0.1

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Andromedæ. Mag. 4.5		$\delta$ Andromedæ. Mag. 3.5		$\alpha$ Cassiopeie. (Schediv.) Var. 2.2-2.8		$\mu$ Phœnicis. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 34	° ' " +28 51	h m 0 34	° ' " +30 24	h m 0 35	° ' " +56 4	h m 0 37	° ' " -46 31
	s	"	s	"	s	"	s	"
Jan. 0.2	10.879	56.04	54.075	40.59	48.101	79.47	25.410	96.09
10.2	10.742	55.33	53.936	39.88	47.827	79.06	25.194	96.00
20.2	10.605	54.36	53.795	38.92	47.554	78.15	24.986	95.44
30.2	10.475	53.16	53.661	37.70	47.293	76.78	24.792	94.42
Feb. 9.1	10.358	51.80	53.542	36.31	47.056	74.99	24.620	92.95
19.1	10.261	50.33	53.442	34.79	46.857	72.86	24.474	91.09
Mar. 1.1	10.193	48.81	53.371	33.22	46.707	70.50	24.363	88.86
11.1	10.158	47.32	53.334	31.66	46.617	68.00	24.292	86.31
21.0	10.163	45.93	53.339	30.20	46.594	65.46	24.265	83.51
31.0	10.213	44.73	53.390	28.90	46.644	62.99	24.288	80.49
Apr. 10.0	10.311	43.75	53.488	27.85	46.768	60.69	24.362	77.34
19.9	10.457	43.07	53.636	27.09	46.969	58.68	24.490	74.11
29.9	10.649	42.73	53.832	26.66	47.240	57.01	24.672	70.87
May 9.9	10.884	42.73	54.071	26.60	47.576	55.78	24.906	67.69
19.9	11.160	43.12	54.349	26.92	47.968	54.96	25.187	64.64
29.8	11.467	43.88	54.660	27.60	48.405	54.65	25.509	61.77
June 8.8	11.796	44.99	54.995	28.66	48.875	54.84	25.865	59.18
18.8	12.141	46.41	55.346	30.05	49.365	55.53	26.246	56.91
28.8	12.494	48.13	55.702	31.74	49.863	56.69	26.643	55.01
July 8.7	12.842	50.09	56.055	33.68	50.354	58.30	27.044	53.56
18.7	13.180	52.24	56.397	35.84	50.830	60.31	27.437	52.57
28.7	13.499	54.53	56.720	38.13	51.277	62.67	27.816	52.07
Aug. 7.6	13.790	56.89	57.016	40.53	51.687	65.34	28.166	52.08
17.6	14.050	59.29	57.280	42.97	52.053	68.24	28.480	52.59
27.6	14.275	61.66	57.510	45.40	52.368	71.33	28.751	53.57
Sept. 6.6	14.462	63.97	57.700	47.77	52.628	74.52	28.973	54.97
16.5	14.609	66.16	57.850	50.04	52.832	77.77	29.141	56.76
26.5	14.717	68.20	57.961	52.16	52.978	81.00	29.252	58.86
Oct. 6.5	14.787	70.07	58.033	54.12	53.066	84.15	29.307	61.17
16.5	14.821	71.72	58.068	55.87	53.098	87.15	29.307	63.61
26.4	14.822	73.16	58.071	57.39	53.076	89.95	29.257	66.07
Nov. 5.4	14.793	74.33	58.042	58.66	53.004	92.48	29.163	68.46
15.4	14.737	75.24	57.987	59.66	52.885	94.69	29.029	70.66
25.3	14.657	75.86	57.907	60.36	52.722	96.52	28.863	72.60
Dec. 5.3	14.558	76.19	57.807	60.77	52.522	97.91	28.673	74.20
15.3	14.442	76.22	57.688	60.85	52.291	98.83	28.464	75.38
25.3	14.314	75.94	57.557	60.61	52.034	99.24	28.246	76.11
35.2	14.178	75.39	57.418	60.09	51.763	99.14	28.025	76.37
Mean Place	9.953	40.54	53.148	24.57	47.272	56.41	24.283	87.18
Sec $\delta$ , Tan $\delta$	1.142	+0.551	1.160	+0.587	1.792	+1.487	1.453	-1.055
$D\alpha$ , $D\alpha$	+0.06	-0.04	+0.06	-0.04	+0.07	-0.10	+0.06	+0.07
$D\delta$ , $D\delta$	+0.4	+0.1	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Ceti. Mag. 2.2		$\gamma$ Cassiopeiæ. Mag. 4.7		$\delta$ Cassiopeiæ. Mag. 5.6		$\zeta$ Andromedæ. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 39	° ' " -18 25	h m 0 40	° ' " +47 49	h m 0 40	° ' " +74 32	h m 0 42	° ' " +23 48
	s	"	s	"	s	"	s	"
Jan. 0.3	26.503	91.72	6.539	70.41	9.22	30.88	57.151	71.04
10.2	26.380 <sup>123</sup>	92.20 <sup>48</sup>	6.330 <sup>209</sup>	69.93 <sup>48</sup>	8.53 <sup>69</sup>	30.87 <sup>1</sup>	57.024 <sup>127</sup>	70.35 <sup>69</sup>
20.2	26.259 <sup>121</sup>	92.42 <sup>22</sup>	6.119 <sup>211</sup>	69.00 <sup>93</sup>	7.84 <sup>69</sup>	30.26 <sup>61</sup>	56.896 <sup>128</sup>	69.47 <sup>88</sup>
30.2	26.145 <sup>114</sup>	92.38 <sup>4</sup>	5.916 <sup>203</sup>	67.68 <sup>132</sup>	7.18 <sup>66</sup>	29.06 <sup>120</sup>	56.772 <sup>124</sup>	68.42 <sup>105</sup>
Feb. 9.1	26.042 <sup>103</sup>	92.07 <sup>31</sup>	5.731 <sup>185</sup>	66.01 <sup>167</sup>	6.58 <sup>60</sup>	27.33 <sup>173</sup>	56.659 <sup>113</sup>	67.22 <sup>120</sup>
	86	58	156	194	52	220	96	125
19.1	25.956 <sup>63</sup>	91.49 <sup>84</sup>	5.575 <sup>117</sup>	64.07 <sup>215</sup>	6.06 <sup>39</sup>	25.13 <sup>257</sup>	56.563 <sup>71</sup>	65.97 <sup>127</sup>
Mar. 1.1	25.893 <sup>34</sup>	90.65 <sup>112</sup>	5.458 <sup>71</sup>	61.92 <sup>223</sup>	5.67 <sup>28</sup>	22.56 <sup>282</sup>	56.492 <sup>89</sup>	64.70 <sup>122</sup>
11.1	25.859 <sup>2</sup>	89.53 <sup>136</sup>	5.387 <sup>16</sup>	59.69 <sup>224</sup>	5.39 <sup>13</sup>	19.74 <sup>296</sup>	56.453 <sup>3</sup>	63.48 <sup>110</sup>
21.0	25.857 <sup>36</sup>	88.17 <sup>161</sup>	5.371 <sup>44</sup>	57.45 <sup>214</sup>	5.26 <sup>4</sup>	16.79 <sup>297</sup>	56.450 <sup>41</sup>	62.38 <sup>93</sup>
31.0	25.893 <sup>77</sup>	86.56 <sup>183</sup>	5.415 <sup>107</sup>	55.31 <sup>196</sup>	5.30 <sup>18</sup>	13.82 <sup>288</sup>	56.491 <sup>86</sup>	61.45 <sup>69</sup>
Apr. 10.0	25.970 <sup>119</sup>	84.73 <sup>201</sup>	5.522 <sup>169</sup>	53.36 <sup>167</sup>	5.48 <sup>34</sup>	10.94 <sup>265</sup>	56.577 <sup>132</sup>	60.76 <sup>42</sup>
20.0	26.089 <sup>162</sup>	82.72 <sup>219</sup>	5.691 <sup>230</sup>	51.69 <sup>132</sup>	5.82 <sup>49</sup>	8.29 <sup>235</sup>	56.709 <sup>179</sup>	60.34 <sup>10</sup>
29.9	26.251 <sup>202</sup>	80.53 <sup>230</sup>	5.921 <sup>287</sup>	50.37 <sup>95</sup>	6.31 <sup>60</sup>	5.94 <sup>195</sup>	56.888 <sup>221</sup>	60.24 <sup>24</sup>
May 9.9	26.453 <sup>238</sup>	78.23 <sup>238</sup>	6.208 <sup>335</sup>	49.42 <sup>49</sup>	6.91 <sup>72</sup>	3.99 <sup>148</sup>	57.109 <sup>260</sup>	60.48 <sup>57</sup>
19.9	26.691 <sup>271</sup>	75.85 <sup>239</sup>	6.543 <sup>374</sup>	48.93 <sup>4</sup>	7.63 <sup>81</sup>	2.51 <sup>97</sup>	57.369 <sup>291</sup>	61.05 <sup>90</sup>
29.8	26.962 <sup>296</sup>	73.46 <sup>235</sup>	6.917 <sup>404</sup>	48.89 <sup>42</sup>	8.44 <sup>87</sup>	1.54 <sup>43</sup>	57.660 <sup>316</sup>	61.95 <sup>123</sup>
June 8.8	27.258 <sup>313</sup>	71.11 <sup>226</sup>	7.321 <sup>423</sup>	49.31 <sup>88</sup>	9.31 <sup>91</sup>	1.11 <sup>11</sup>	57.976 <sup>333</sup>	63.18 <sup>150</sup>
18.8	27.571 <sup>323</sup>	68.85 <sup>209</sup>	7.744 <sup>431</sup>	50.19 <sup>130</sup>	10.22 <sup>93</sup>	1.22 <sup>67</sup>	58.309 <sup>340</sup>	64.68 <sup>175</sup>
28.8	27.894 <sup>324</sup>	66.76 <sup>190</sup>	8.175 <sup>427</sup>	51.49 <sup>169</sup>	11.15 <sup>92</sup>	1.89 <sup>119</sup>	58.649 <sup>339</sup>	66.43 <sup>193</sup>
July 8.7	28.218 <sup>318</sup>	64.86 <sup>163</sup>	8.602 <sup>414</sup>	53.18 <sup>205</sup>	12.07 <sup>89</sup>	3.08 <sup>169</sup>	58.988 <sup>330</sup>	68.36 <sup>210</sup>
18.7	28.536 <sup>302</sup>	63.23 <sup>134</sup>	9.016 <sup>391</sup>	55.23 <sup>233</sup>	12.96 <sup>84</sup>	4.77 <sup>215</sup>	59.318 <sup>312</sup>	70.46 <sup>218</sup>
28.7	28.838 <sup>280</sup>	61.89 <sup>100</sup>	9.407 <sup>360</sup>	57.56 <sup>259</sup>	13.80 <sup>77</sup>	6.92 <sup>256</sup>	59.630 <sup>290</sup>	72.64 <sup>223</sup>
Aug. 7.7	29.118 <sup>252</sup>	60.89 <sup>65</sup>	9.767 <sup>322</sup>	60.15 <sup>277</sup>	14.57 <sup>69</sup>	9.48 <sup>291</sup>	59.920 <sup>260</sup>	74.87 <sup>221</sup>
17.6	29.370 <sup>218</sup>	60.24 <sup>30</sup>	10.089 <sup>280</sup>	62.92 <sup>289</sup>	15.26 <sup>48</sup>	12.39 <sup>342</sup>	60.180 <sup>191</sup>	77.08 <sup>216</sup>
27.6	29.588 <sup>181</sup>	59.94 <sup>5</sup>	10.369 <sup>233</sup>	65.81 <sup>296</sup>	15.86 <sup>48</sup>	15.59 <sup>320</sup>	60.406 <sup>191</sup>	79.24 <sup>206</sup>
Sept. 6.6	29.769 <sup>143</sup>	59.99 <sup>39</sup>	10.602 <sup>185</sup>	68.77 <sup>297</sup>	16.34 <sup>38</sup>	19.01 <sup>359</sup>	60.597 <sup>153</sup>	81.30 <sup>193</sup>
16.5	29.912 <sup>103</sup>	60.38 <sup>69</sup>	10.787 <sup>137</sup>	71.74 <sup>292</sup>	16.72 <sup>27</sup>	22.60 <sup>366</sup>	60.750 <sup>115</sup>	83.23 <sup>177</sup>
26.5	30.015 <sup>65</sup>	61.07 <sup>93</sup>	10.924 <sup>89</sup>	74.66 <sup>281</sup>	16.99 <sup>14</sup>	26.26 <sup>367</sup>	60.865 <sup>78</sup>	85.00 <sup>157</sup>
Oct. 6.5	30.080 <sup>28</sup>	62.00 <sup>114</sup>	11.013 <sup>42</sup>	77.47 <sup>265</sup>	17.13 <sup>2</sup>	29.93 <sup>361</sup>	60.943 <sup>45</sup>	86.57 <sup>138</sup>
16.5	30.108 <sup>5</sup>	63.14 <sup>128</sup>	11.055 <sup>2</sup>	80.12 <sup>244</sup>	17.15 <sup>9</sup>	33.54 <sup>344</sup>	60.988 <sup>12</sup>	87.95 <sup>115</sup>
26.4	30.103 <sup>34</sup>	64.42 <sup>135</sup>	11.053 <sup>43</sup>	82.56 <sup>217</sup>	17.06 <sup>21</sup>	36.98 <sup>323</sup>	61.000 <sup>17</sup>	89.10 <sup>92</sup>
Nov. 5.4	30.069 <sup>59</sup>	65.77 <sup>136</sup>	11.010 <sup>82</sup>	84.73 <sup>188</sup>	16.85 <sup>31</sup>	40.21 <sup>292</sup>	60.983 <sup>42</sup>	90.02 <sup>67</sup>
15.4	30.010 <sup>82</sup>	67.13 <sup>131</sup>	10.928 <sup>117</sup>	86.61 <sup>151</sup>	16.54 <sup>43</sup>	43.13 <sup>253</sup>	60.941 <sup>67</sup>	90.69 <sup>43</sup>
25.4	29.928 <sup>98</sup>	68.44 <sup>119</sup>	10.811 <sup>146</sup>	88.12 <sup>111</sup>	16.11 <sup>51</sup>	45.66 <sup>206</sup>	60.874 <sup>103</sup>	91.12 <sup>7</sup>
Dec. 5.3	29.830 <sup>110</sup>	69.63 <sup>106</sup>	10.665 <sup>174</sup>	89.23 <sup>69</sup>	15.60 <sup>59</sup>	47.72 <sup>155</sup>	60.788 <sup>103</sup>	91.29 <sup>7</sup>
15.3	29.720 <sup>121</sup>	70.69 <sup>87</sup>	10.491 <sup>193</sup>	89.92 <sup>24</sup>	15.01 <sup>65</sup>	49.27 <sup>96</sup>	60.685 <sup>118</sup>	91.22 <sup>33</sup>
25.3	29.599 <sup>125</sup>	71.56 <sup>63</sup>	10.298 <sup>208</sup>	90.16 <sup>20</sup>	14.36 <sup>68</sup>	50.23 <sup>37</sup>	60.567 <sup>126</sup>	90.89 <sup>56</sup>
35.2	29.474	72.19	10.090	89.96	13.68	50.60	60.441	90.33
Mean Place	25.444	90.85	5.617	49.29	8.510	4.64	56.147	57.14
Sec $\delta$ , Tan $\delta$	1.054	-0.333	1.490	+1.104	3.750	+3.615	1.093	+0.441
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06	+0.02	+0.07	-0.07	+0.08	-0.24	+0.06	-0.03
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Cassiopeiae. Mag. 3.6		$\delta$ Piscium. Mag. 4.6		$\lambda$ Hydri. Mag. 5.0		20 Ceti. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 44	" ' s +57 22	h m 0 44	" ' s + 7 8	h m 0 45	" ' s -75 21	h m 0 48	" ' s -1 35
	s	"	s	"	s	"	s	"
Jan. 0.3	5.127	58.92	23.511	9.06	44.83	102.71	46.956	35.46
10.2	4.845 <sup>282</sup>	58.62 <sup>30</sup>	23.401 <sup>110</sup>	8.37 <sup>69</sup>	44.03 <sup>80</sup>	102.06 <sup>65</sup>	46.846 <sup>110</sup>	36.12 <sup>66</sup>
20.2	4.561 <sup>284</sup>	57.80 <sup>82</sup>	23.291 <sup>110</sup>	7.65 <sup>72</sup>	43.27 <sup>76</sup>	100.81 <sup>125</sup>	46.735 <sup>111</sup>	36.71 <sup>59</sup>
30.2	4.286 <sup>275</sup>	56.51 <sup>129</sup>	23.183 <sup>108</sup>	6.95 <sup>70</sup>	42.55 <sup>72</sup>	99.00 <sup>181</sup>	46.627 <sup>108</sup>	37.20 <sup>49</sup>
Feb. 9.1	4.036 <sup>250</sup>	54.80 <sup>171</sup>	23.086 <sup>97</sup>	6.27 <sup>68</sup>	41.90 <sup>65</sup>	96.68 <sup>232</sup>	46.527 <sup>100</sup>	37.56 <sup>36</sup>
	212	208	84	60	55	278	85	21
19.1	3.824 <sup>165</sup>	52.72 <sup>234</sup>	23.002 <sup>60</sup>	5.67 <sup>48</sup>	41.35 <sup>46</sup>	93.90 <sup>314</sup>	46.442 <sup>63</sup>	37.77 <sup>5</sup>
Mar. 1.1	3.659 <sup>106</sup>	50.38 <sup>251</sup>	22.942 <sup>33</sup>	5.19 <sup>35</sup>	40.89 <sup>34</sup>	90.76 <sup>346</sup>	46.379 <sup>37</sup>	37.82 <sup>15</sup>
11.1	3.553 <sup>36</sup>	47.87 <sup>257</sup>	22.909 <sup>1</sup>	4.84 <sup>15</sup>	40.55 <sup>23</sup>	87.30 <sup>365</sup>	46.342 <sup>6</sup>	37.67 <sup>36</sup>
21.0	3.517 <sup>39</sup>	45.30 <sup>252</sup>	22.908 <sup>37</sup>	4.69 <sup>6</sup>	40.32 <sup>8</sup>	83.65 <sup>377</sup>	46.336 <sup>31</sup>	37.31 <sup>60</sup>
31.0	3.556 <sup>117</sup>	42.78 <sup>237</sup>	22.945 <sup>79</sup>	4.75 <sup>31</sup>	40.24 <sup>4</sup>	79.88 <sup>383</sup>	46.367 <sup>71</sup>	36.71 <sup>83</sup>
Apr. 10.0	3.673 <sup>195</sup>	40.41 <sup>212</sup>	23.024 <sup>120</sup>	5.06 <sup>57</sup>	40.28 <sup>18</sup>	76.05 <sup>380</sup>	46.438 <sup>113</sup>	35.88 <sup>108</sup>
20.0	3.868 <sup>269</sup>	38.29 <sup>178</sup>	23.144 <sup>164</sup>	5.63 <sup>83</sup>	40.46 <sup>30</sup>	72.25 <sup>368</sup>	46.551 <sup>155</sup>	34.80 <sup>131</sup>
29.9	4.137 <sup>339</sup>	36.51 <sup>139</sup>	23.308 <sup>202</sup>	6.46 <sup>110</sup>	40.76 <sup>45</sup>	68.57 <sup>348</sup>	46.706 <sup>194</sup>	33.49 <sup>152</sup>
May 9.9	4.476 <sup>397</sup>	35.12 <sup>94</sup>	23.510 <sup>238</sup>	7.56 <sup>133</sup>	41.21 <sup>55</sup>	65.09 <sup>323</sup>	46.900 <sup>230</sup>	31.97 <sup>172</sup>
19.9	4.873 <sup>447</sup>	34.18 <sup>45</sup>	23.748 <sup>270</sup>	8.89 <sup>157</sup>	41.76 <sup>66</sup>	61.86 <sup>288</sup>	47.130 <sup>262</sup>	30.25 <sup>189</sup>
29.8	5.320 <sup>482</sup>	33.73 <sup>4</sup>	24.018 <sup>204</sup>	10.46 <sup>174</sup>	42.42 <sup>75</sup>	58.98 <sup>247</sup>	47.392 <sup>286</sup>	28.36 <sup>197</sup>
June 8.8	5.802 <sup>506</sup>	33.77 <sup>54</sup>	24.312 <sup>310</sup>	12.20 <sup>187</sup>	43.17 <sup>81</sup>	56.51 <sup>200</sup>	47.678 <sup>305</sup>	26.39 <sup>203</sup>
18.8	6.308 <sup>515</sup>	34.31 <sup>102</sup>	24.622 <sup>318</sup>	14.07 <sup>197</sup>	43.98 <sup>88</sup>	54.51 <sup>150</sup>	47.983 <sup>314</sup>	24.36 <sup>205</sup>
28.8	6.823 <sup>513</sup>	35.33 <sup>147</sup>	24.940 <sup>320</sup>	16.04 <sup>202</sup>	44.86 <sup>90</sup>	53.01 <sup>94</sup>	48.297 <sup>316</sup>	22.31 <sup>200</sup>
July 8.7	7.336 <sup>497</sup>	36.80 <sup>188</sup>	25.260 <sup>311</sup>	18.06 <sup>199</sup>	45.76 <sup>89</sup>	52.07 <sup>36</sup>	48.613 <sup>308</sup>	20.31 <sup>191</sup>
18.7	7.833 <sup>472</sup>	38.68 <sup>226</sup>	25.571 <sup>296</sup>	20.05 <sup>194</sup>	46.65 <sup>87</sup>	51.71 <sup>21</sup>	48.921 <sup>296</sup>	18.40 <sup>176</sup>
28.7	8.305 <sup>435</sup>	40.94 <sup>258</sup>	25.867 <sup>274</sup>	21.99 <sup>183</sup>	47.52 <sup>81</sup>	51.92 <sup>79</sup>	49.217 <sup>276</sup>	16.64 <sup>157</sup>
Aug. 7.7	8.740 <sup>392</sup>	43.52 <sup>282</sup>	26.141 <sup>248</sup>	23.82 <sup>166</sup>	48.33 <sup>74</sup>	52.71 <sup>135</sup>	49.493 <sup>248</sup>	15.07 <sup>135</sup>
17.6	9.132 <sup>341</sup>	46.34 <sup>304</sup>	26.389 <sup>215</sup>	25.48 <sup>148</sup>	49.07 <sup>63</sup>	54.06 <sup>185</sup>	49.741 <sup>217</sup>	13.72 <sup>109</sup>
27.6	9.473 <sup>287</sup>	49.38 <sup>316</sup>	26.604 <sup>182</sup>	26.96 <sup>127</sup>	49.70 <sup>52</sup>	55.91 <sup>229</sup>	49.958 <sup>185</sup>	12.63 <sup>84</sup>
Sept. 6.6	9.760 <sup>228</sup>	52.54 <sup>322</sup>	26.786 <sup>145</sup>	28.23 <sup>105</sup>	50.22 <sup>37</sup>	58.20 <sup>266</sup>	50.143 <sup>148</sup>	11.79 <sup>56</sup>
16.5	9.988 <sup>169</sup>	55.76 <sup>323</sup>	26.931 <sup>111</sup>	29.28 <sup>82</sup>	50.59 <sup>22</sup>	60.86 <sup>291</sup>	50.291 <sup>112</sup>	11.23 <sup>29</sup>
26.5	10.157 <sup>110</sup>	58.99 <sup>319</sup>	27.042 <sup>74</sup>	30.10 <sup>58</sup>	50.81 <sup>7</sup>	63.77 <sup>308</sup>	50.403 <sup>77</sup>	10.94 <sup>6</sup>
Oct. 6.5	10.267 <sup>52</sup>	62.18 <sup>304</sup>	27.116 <sup>43</sup>	30.68 <sup>37</sup>	50.88 <sup>10</sup>	66.85 <sup>310</sup>	50.480 <sup>45</sup>	10.88 <sup>18</sup>
16.5	10.319 <sup>5</sup>	65.22 <sup>286</sup>	27.159 <sup>12</sup>	31.05 <sup>15</sup>	50.78 <sup>24</sup>	69.95 <sup>302</sup>	50.525 <sup>13</sup>	11.06 <sup>36</sup>
26.4	10.314 <sup>58</sup>	68.08 <sup>260</sup>	27.171 <sup>15</sup>	31.20 <sup>2</sup>	50.54 <sup>39</sup>	72.97 <sup>280</sup>	50.538 <sup>14</sup>	11.42 <sup>52</sup>
Nov. 5.4	10.256 <sup>109</sup>	70.68 <sup>230</sup>	27.156 <sup>38</sup>	31.18 <sup>20</sup>	50.15 <sup>51</sup>	75.77 <sup>250</sup>	50.524 <sup>38</sup>	11.94 <sup>63</sup>
15.4	10.147 <sup>154</sup>	72.98 <sup>192</sup>	27.118 <sup>59</sup>	30.98 <sup>33</sup>	49.64 <sup>63</sup>	78.27 <sup>206</sup>	50.486 <sup>59</sup>	12.57 <sup>72</sup>
25.4	9.993 <sup>196</sup>	74.90 <sup>150</sup>	27.059 <sup>78</sup>	30.65 <sup>45</sup>	49.01 <sup>71</sup>	80.33 <sup>156</sup>	50.427 <sup>77</sup>	13.29 <sup>76</sup>
Dec. 5.3	9.797 <sup>231</sup>	76.40 <sup>104</sup>	26.981 <sup>90</sup>	30.20 <sup>56</sup>	48.30 <sup>77</sup>	81.89 <sup>98</sup>	50.350 <sup>91</sup>	14.05 <sup>78</sup>
15.3	9.566 <sup>260</sup>	77.44 <sup>52</sup>	26.891 <sup>102</sup>	29.64 <sup>62</sup>	47.53 <sup>80</sup>	82.87 <sup>38</sup>	50.259 <sup>102</sup>	14.83 <sup>76</sup>
25.3	9.306 <sup>278</sup>	77.96 <sup>0</sup>	26.789 <sup>110</sup>	29.02 <sup>71</sup>	46.73 <sup>81</sup>	83.25 <sup>23</sup>	50.157 <sup>109</sup>	15.59 <sup>71</sup>
35.2	9.028	77.96	26.679	28.31	45.92	83.02	50.048	16.30
Mean Place	4.191	35.55	22.471	0.98	43.258	89.58	45.876	40.46
Sec $\delta$ , Tan $\delta$	1.855	+1.563	1.008	+0.125	3.959	-3.831	1.000	-0.028
$D_\phi a$ , $D_\omega a$	+0.07	-0.10	+0.06	-0.01	+0.04	+0.26	+0.06	0.00
$D_\phi \delta$ , $D_\omega \delta$	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Cassiopeiæ. Mag. 2.2		$\mu$ Andromedæ. Mag. 3.9		$\alpha$ Sculptoris. Mag. 4.4		$\epsilon$ Piscium. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 0 51	" " +60 16	h m 0 52	" " +38 2	h m 0 54	" " -29 47	h m 0 58	" " + 7 26
	s 42.29	" 27.24	s 9.522	" 76.25	s 37.542	" 86.03	s 39.160	" 45.01
Jan. 0.3	32 41.97	14 27.10	162 9.360	50 75.75	150 37.392	40 86.43	111 39.049	67 44.34
10.2	33 41.64	68 26.42	167 9.193	84 74.91	149 37.243	5 86.48	115 38.934	70 43.64
20.2	31 41.33	119 25.23	163 9.030	118 73.75	145 37.098	32 86.16	113 38.821	69 42.95
30.2	30 41.03	164 23.59	152 8.878	142 72.33	133 36.965	68 85.48	107 38.714	66 42.29
Feb. 9.2	25 41.03	203 21.56	131 8.747	164 70.69	115 36.850	103 84.45	94 38.620	59 41.70
19.1	20 40.78	232 19.24	102 8.645	177 68.92	92 36.758	136 83.09	72 38.548	50 41.20
Mar. 1.1	14 40.58	254 16.70	64 8.581	183 67.09	63 36.695	168 81.41	48 38.500	35 40.85
11.1	6 40.44	262 14.08	20 8.561	180 65.29	27 36.668	195 79.46	14 38.486	16 40.69
21.0	2 40.38	259 11.49	30 8.591	167 63.62	13 36.681	221 77.25	23 38.509	3 40.72
31.0	10 40.40	248 9.01	84 8.675	150 62.12	56 36.737	241 74.84	64 38.573	28 41.00
Apr. 10.0	19 40.69	224 6.77	139 8.814	122 60.90	101 36.838	258 72.26	107 38.680	52 41.52
20.0	27 40.96	194 4.83	192 9.006	91 59.99	146 36.984	269 69.57	150 38.830	79 42.31
29.9	34 41.30	155 3.28	241 9.247	54 59.45	191 37.175	276 66.81	190 39.020	104 43.35
May 9.9	41 41.71	111 2.17	287 9.534	15 59.30	232 37.407	277 64.04	229 39.249	139 44.65
19.9	47 42.18	63 1.54	323 9.857	25 59.55	270 37.677	270 61.34	262 39.511	150 46.15
29.9	51 42.69	13 1.41	352 10.209	66 60.21	299 37.976	258 58.76	287 39.798	170 47.85
June 8.8	53 43.22	37 1.78	371 10.580	104 61.25	321 38.297	239 56.37	306 40.104	183 49.68
18.8	55 43.77	87 2.65	382 10.962	139 62.64	336 38.633	215 54.22	316 40.420	193 51.61
28.8	55 44.32	133 3.98	381 11.343	172 64.36	341 38.974	185 52.37	319 40.739	197 53.58
July 8.7	53 44.85	178 5.76	372 11.715	200 66.36	337 39.311	150 50.87	315 41.054	197 55.55
18.7	51 45.36	216 7.92	354 12.069	222 68.58	325 39.636	110 49.77	300 41.354	191 57.46
28.7	47 45.83	251 10.43	330 12.399	239 70.97	304 39.940	69 49.08	281 41.635	181 59.27
Aug. 7.7	43 46.26	278 13.21	298 12.697	251 73.48	278 40.218	25 48.83	256 41.891	165 60.92
17.6	37 46.63	302 16.23	262 12.959	259 76.07	243 40.461	17 49.00	227 42.118	149 62.41
27.6	32 46.95	318 19.41	222 13.181	259 78.66	205 40.666	58 49.58	193 42.311	128 63.69
Sept. 6.6	25 47.20	327 22.68	182 13.363	254 81.20	164 40.830	95 50.53	159 42.470	104 64.73
16.6	20 47.40	330 25.98	141 13.504	246 83.66	121 40.951	130 51.83	124 42.594	82 65.55
26.5	13 47.53	327 29.25	99 13.603	234 86.00	78 41.029	156 53.39	90 42.684	59 66.14
Oct. 6.5	6 47.59	318 32.43	59 13.662	217 88.17	37 41.066	176 55.15	57 42.741	37 66.51
16.5	1 47.60	300 35.43	21 13.683	196 90.13	0 41.066	187 57.02	26 42.767	16 66.67
26.4	6 47.54	278 38.21	14 13.669	171 91.84	36 41.030	110 58.94	1 42.766	2 66.65
Nov. 5.4	11 47.43	246 40.67	45 13.624	145 93.29	66 40.964	192 60.80	26 42.740	18 66.47
15.4	16 47.27	211 42.78	77 13.547	113 94.42	92 40.872	174 62.54	48 42.692	32 66.15
25.4	22 47.05	169 44.47	102 13.445	80 95.22	114 40.758	154 64.08	69 42.623	44 65.71
Dec. 5.3	25 46.80	121 45.68	127 13.318	45 95.67	131 40.627	129 65.37	85 42.538	54 65.17
15.3	29 46.51	71 46.39	144 13.174	8 95.75	143 40.484	99 66.36	99 42.439	62 64.55
25.3	31 46.20	18 46.57	160 13.014	29 95.46	151 40.333	85 67.01	109 42.330	67 63.88
Mean Place	41.231	3.24	8.460	57.80	36.370	81.70	38.030	36.74
Sec $\delta$ , Tan $\delta$	2.016	+1.751	1.270	+0.783	1.153	-0.573	1.008	+0.131
$D\psi\alpha$ , $D\omega\alpha$	+0.07	-0.11	+0.07	-0.05	+0.06	+0.04	+0.06	-0.01
$D\psi\delta$ , $D\omega\delta$	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2	+0.4	+0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Phœnicis. Mag. 3.4		$\mu$ Cassiopeiæ. Mag. 5.3		$\eta$ Ceti. Mag. 3.6		$\beta$ Andromedæ. Mag. 2.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 2	° ' " —47 9	h m 1 2	° ' " +54 30	h m 1 4	° ' " —10 36	h m 1 5	° ' " +35 10
	s	"	s	"	s	"	s	"
Jan. 0.3	24.100	56.84 21	45.396	72.47	26.046	76.74	5.937	68.45
10.2	23.872 <sup>228</sup>	57.05 —	45.152 <sup>244</sup>	72.30 17	25.929 <sup>117</sup>	77.38 64	5.786 <sup>151</sup>	68.02 43
20.2	23.645 <sup>227</sup>	56.75 30	44.901 <sup>251</sup>	71.64 66	25.809 <sup>120</sup>	77.87 49	5.628 <sup>158</sup>	67.27 75
30.2	23.427 <sup>218</sup>	55.96 79	44.652 <sup>249</sup>	70.51 113	25.692 <sup>117</sup>	78.14 27	5.470 <sup>158</sup>	66.23 104
Feb. 9.2	23.225 <sup>202</sup>	54.70 126	44.418 <sup>234</sup>	68.97 154	25.580 <sup>112</sup>	78.22 8	5.320 <sup>150</sup>	64.93 130
	179	170	204	190	99	15	133	148
19.1	23.046	53.00	44.214	67.07	25.481	78.07	5.187	63.45
Mar. 1.1	22.898 <sup>148</sup>	50.91 209	44.050 <sup>164</sup>	64.88 219	25.401 <sup>80</sup>	77.68 39	5.080 <sup>107</sup>	61.83 162
11.1	22.787 <sup>111</sup>	48.46 245	43.938 <sup>112</sup>	62.52 236	25.346 <sup>55</sup>	77.05 63	5.007 <sup>73</sup>	60.17 166
21.0	22.719 <sup>68</sup>	45.73 273	43.887 <sup>51</sup>	60.07 245	25.323 <sup>23</sup>	76.18 87	4.975 <sup>32</sup>	58.54 163
31.0	22.701 <sup>18</sup>	42.75 298	43.904 <sup>17</sup>	57.64 243	25.336 <sup>13</sup>	75.07 111	4.991 <sup>16</sup>	57.00 154
	35	316	90	231	52	135	67	136
Apr. 10.0	22.736	39.59	43.994	55.33	25.388	73.72	5.058	55.64
20.0	22.826 <sup>90</sup>	36.33 326	44.157 <sup>163</sup>	53.24 209	25.482 <sup>94</sup>	72.14 158	5.178 <sup>120</sup>	54.53 111
29.9	22.972 <sup>146</sup>	33.01 332	44.393 <sup>236</sup>	51.45 179	25.619 <sup>137</sup>	70.37 177	5.350 <sup>172</sup>	53.72 81
May 9.9	23.173 <sup>201</sup>	29.72 329	44.695 <sup>302</sup>	50.01 144	25.798 <sup>179</sup>	68.43 194	5.573 <sup>223</sup>	53.24 48
19.9	23.425 <sup>252</sup>	26.53 319	45.057 <sup>362</sup>	48.99 102	26.015 <sup>217</sup>	66.33 210	5.840 <sup>267</sup>	53.14 10
	298	302	412	56	251	217	306	27
29.9	23.723	23.51	45.469	48.43	26.266	64.16	6.146	53.41
June 8.8	24.061 <sup>338</sup>	20.72 279	45.920 <sup>451</sup>	48.33 10	26.544 <sup>278</sup>	61.95 221	6.482 <sup>336</sup>	54.06 65
18.8	24.428 <sup>367</sup>	18.25 247	46.398 <sup>478</sup>	48.70 37	26.844 <sup>300</sup>	59.75 220	6.840 <sup>358</sup>	55.07 101
28.8	24.816 <sup>388</sup>	16.15 210	46.892 <sup>494</sup>	49.54 84	27.157 <sup>313</sup>	57.63 212	7.209 <sup>369</sup>	56.41 134
July 8.7	25.216 <sup>400</sup>	14.47 168	47.387 <sup>495</sup>	50.81 127	27.475 <sup>318</sup>	55.63 200	7.582 <sup>373</sup>	58.06 165
	398	121	486	168	313	182	366	189
18.7	25.614	13.26	47.873	52.49	27.788	53.81	7.948	59.95
28.7	26.003 <sup>389</sup>	12.55 71	48.339 <sup>466</sup>	54.53 204	28.091 <sup>303</sup>	52.22 159	8.299 <sup>351</sup>	62.06 211
Aug. 7.7	26.370 <sup>367</sup>	12.36 19	48.776 <sup>437</sup>	56.87 234	28.376 <sup>285</sup>	50.59 133	8.629 <sup>330</sup>	64.32 226
17.6	26.706 <sup>336</sup>	12.70 34	49.176 <sup>400</sup>	59.48 261	28.637 <sup>261</sup>	49.88 101	8.929 <sup>300</sup>	66.68 236
27.6	27.002 <sup>296</sup>	13.53 83	49.532 <sup>356</sup>	62.28 280	28.868 <sup>231</sup>	49.18 70	9.196 <sup>267</sup>	69.09 241
	250	131	307	294	198	39	232	242
Sept. 6.6	27.252 <sup>199</sup>	14.84 172	49.839 <sup>256</sup>	65.22 303	29.066 <sup>163</sup>	48.79 7	9.428 <sup>192</sup>	71.51 237
16.6	27.451 <sup>145</sup>	16.56 208	50.095 <sup>202</sup>	68.25 304	29.229 <sup>127</sup>	48.72 24	9.620 <sup>153</sup>	73.88 229
26.5	27.596 <sup>89</sup>	18.64 234	50.297 <sup>148</sup>	71.29 298	29.356 <sup>92</sup>	48.96 50	9.773 <sup>113</sup>	76.17 215
Oct. 6.5	27.685 <sup>34</sup>	20.98 251	50.445 <sup>93</sup>	74.27 290	29.448 <sup>57</sup>	49.46 75	9.886 <sup>75</sup>	78.32 200
16.5	27.719 <sup>18</sup>	23.49 258	50.538 <sup>42</sup>	77.17 274	29.505 <sup>24</sup>	50.21 91	9.961 <sup>39</sup>	80.32 180
26.4	27.701	26.07	50.580	79.91	29.529	51.12	10.000	82.12
Nov. 5.4	27.634 <sup>67</sup>	28.62 255	50.571 <sup>9</sup>	82.42 251	29.525 <sup>4</sup>	52.16 104	10.005 <sup>5</sup>	83.69 157
15.4	27.524 <sup>110</sup>	31.03 241	50.513 <sup>58</sup>	84.65 223	29.494 <sup>31</sup>	53.27 111	9.977 <sup>28</sup>	85.02 133
25.4	27.377 <sup>147</sup>	33.20 217	50.409 <sup>104</sup>	86.54 189	29.440 <sup>54</sup>	54.41 114	9.919 <sup>58</sup>	86.06 104
Dec. 5.3	27.199 <sup>178</sup>	35.06 186	50.265 <sup>144</sup>	88.05 151	29.365 <sup>75</sup>	55.52 111	9.834 <sup>85</sup>	86.80 74
	202	145	181	107	91	103	109	43
15.3	26.997	36.51	50.084	89.12	29.274	56.55	9.725	87.23
25.3	26.778 <sup>219</sup>	37.53 102	49.870 <sup>214</sup>	89.73 61	29.170 <sup>104</sup>	57.47 92	9.595 <sup>130</sup>	87.31 8
35.3	26.549 <sup>229</sup>	38.06 53	49.634 <sup>236</sup>	89.86 13	29.055 <sup>115</sup>	58.26 79	9.447 <sup>148</sup>	87.06 25
Mean Place	22.806	48.05	44.206	49.74	24.862	78.66	4.762	50.85
Sec $\delta$ , Tan $\delta$	1.471	—1.079	1.723	+1.403	1.017	—0.187	1.223	+0.705
$D\psi \alpha$ , $D_w \alpha$	+0.05	+0.07	+0.07	—0.09	+0.06	+0.01	+0.07	—0.05
$D\psi \delta$ , $D_w \delta$	+0.4	+0.3	+0.4	+0.3	+0.4	+0.3	+0.4	+0.3

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\tau$ Piscium. Mag. 4.7			$\zeta$ Piscium. Mag. 5.6			$\kappa$ Tucanæ. Mag. 5.0			$f$ Piscium. Mag. 5.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 1 7	s 1 7	" ' +29 38	h m 1 9	s 1 9	" ' + 7 8	h m 1 12	s 1 12	" ' -69 18	h m 1 13	s 1 13	" ' + 3 10
Jan. 0.3	6.276	136	73.39	24.792	109	20.55	59.02	55	73.55	32.212	109	46.46
10.2	6.140	143	72.90	24.683	116	19.88	58.47	55	73.43	32.103	117	45.77
20.2	5.997	144	72.15	24.567	117	19.20	57.92	53	72.72	31.986	117	45.11
30.2	5.853	137	71.17	24.450	111	18.53	57.39	49	71.42	31.869	112	44.52
Feb. 9.2	5.716	121	69.98	24.339	100	17.89	56.90	44	69.58	31.757	104	43.99
19.1	5.595	100	68.66	24.239	80	17.32	56.46	38	67.26	31.653	84	43.58
Mar. 1.1	5.495	67	67.25	24.159	57	16.86	56.08	30	64.51	31.569	60	43.29
11.1	5.428	29	65.84	24.102	24	16.53	55.78	21	61.41	31.509	28	43.19
21.1	5.399	14	64.47	24.078	13	16.38	55.57	13	58.03	31.481	7	43.26
31.0	5.413	62	63.24	24.091	54	16.42	55.44	4	54.42	31.488	47	43.53
Apr. 10.0	5.475	113	62.17	24.145	96	16.71	55.40	6	50.70	31.535	88	44.05
20.0	5.588	162	61.37	24.241	139	17.23	55.46	17	46.94	31.623	136	44.81
29.9	5.750	209	60.85	24.380	182	18.01	55.63	27	43.20	31.759	176	45.80
May 9.9	5.959	253	60.66	24.562	221	19.03	55.90	35	39.58	31.935	213	47.04
19.9	6.212	288	60.82	24.783	254	20.31	56.25	44	36.17	32.148	250	48.49
29.9	6.500	320	61.32	25.037	281	21.79	56.69	52	33.02	32.398	277	50.13
June 8.8	6.820	339	62.17	25.318	303	23.46	57.21	58	30.21	32.675	297	51.94
18.8	7.159	353	63.34	25.621	315	25.26	57.79	63	27.82	32.972	309	53.83
28.8	7.512	355	64.81	25.936	318	27.16	58.42	65	25.90	33.281	315	55.77
July 8.8	7.867	349	66.53	26.254	316	29.10	59.07	67	24.50	33.596	314	57.73
18.7	8.216	337	68.44	26.570	303	31.04	59.74	66	23.65	33.910	303	59.66
28.7	8.553	315	70.53	26.873	287	32.93	60.40	63	23.38	34.213	285	61.49
Aug. 7.7	8.868	289	72.71	27.160	263	34.71	61.03	59	23.71	34.498	264	63.15
17.6	9.157	256	74.95	27.423	235	36.33	61.62	52	24.62	34.762	237	64.66
27.6	9.413	223	77.19	27.658	203	37.78	62.14	44	26.06	34.999	205	65.96
Sept. 6.6	9.636	186	79.40	27.861	170	39.02	62.58	35	28.00	35.204	171	67.00
16.6	9.822	148	81.53	28.031	136	40.04	62.93	24	30.36	35.375	137	67.82
26.5	9.970	111	83.54	28.167	101	40.82	63.17	14	33.08	35.512	104	68.37
Oct. 6.5	10.081	74	85.40	28.268	68	41.38	63.31	3	36.04	35.616	71	68.68
16.5	10.155	41	87.08	28.336	38	41.72	63.34	8	39.13	35.687	41	68.77
26.5	10.196	8	88.57	28.374	8	41.85	63.26	20	42.22	35.728	10	68.65
Nov. 5.4	10.204	23	89.83	28.382	17	41.80	63.06	28	45.20	35.738	13	68.36
15.4	10.181	48	90.86	28.365	40	41.58	62.78	37	47.96	35.725	39	67.94
25.4	10.133	75	91.63	28.325	60	41.23	62.41	44	50.36	35.686	61	67.40
Dec. 5.3	10.058	97	92.15	28.265	80	40.77	61.97	50	52.32	35.625	78	66.78
15.3	9.961	118	92.37	28.185	95	40.22	61.47	53	53.78	35.547	94	66.08
25.3	9.843	131	92.32	28.090	107	39.60	60.94	55	54.66	35.453	106	65.39
35.3	9.712		91.98	27.983		38.93	60.39		54.94	35.347		64.68
Mean Place	5.091		57.55	23.597		12.37	57.309		61.27	30.988		39.65
Sec $\delta$ , Tan $\delta$	1.151		+0.569	1.008		+0.125	2.831		-2.648	1.002		+0.056
$D\psi\alpha$ , $D_w\alpha$	+0.07		-0.04	+0.06		-0.01	+0.04		+0.18	+0.06		0.00
$D\psi\delta$ , $D_w\delta$	+0.4		+0.3	+0.4		+0.3	+0.4		+0.3	+0.4		+0.3



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\nu$ Piscium. Mag. 4.7		$\theta$ Ceti. Mag. 3.8		$\delta$ Cassiopeise. Mag. 2.8		$\gamma$ Phœnicis. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 14 s	° ' " +26 49 "	h m 1 19 s	° ' " - 8 36 "	h m 1 20 s	° ' " +59 48 "	h m 1 24 s	° ' " -43 44 "
Jan. 0.3	55.262	56.29	53.713	37.99	23.925	39.99	47.124	43.97
10.3	55.132 <sup>130</sup>	55.82 <sup>47</sup>	53.597 <sup>116</sup>	38.70 <sup>71</sup>	23.622 <sup>303</sup>	40.18 <sup>19</sup>	46.912 <sup>212</sup>	44.48 <sup>51</sup>
20.2	54.994 <sup>138</sup>	55.10 <sup>72</sup>	53.475 <sup>122</sup>	39.26 <sup>56</sup>	23.304 <sup>318</sup>	39.84 <sup>34</sup>	46.697 <sup>215</sup>	44.51 <sup>3</sup>
30.2	54.854 <sup>140</sup>	54.19 <sup>91</sup>	53.352 <sup>123</sup>	39.64 <sup>38</sup>	22.984 <sup>320</sup>	38.98 <sup>86</sup>	46.485 <sup>212</sup>	44.05 <sup>46</sup>
Feb. 9.2	54.718 <sup>136</sup>	53.11 <sup>108</sup>	53.233 <sup>119</sup>	39.81 <sup>17</sup>	22.678 <sup>306</sup>	37.65 <sup>133</sup>	46.281 <sup>204</sup>	43.13 <sup>92</sup>
19.1	54.596 <sup>122</sup>	51.90 <sup>121</sup>	53.124 <sup>109</sup>	39.78 <sup>3</sup>	22.400 <sup>278</sup>	35.90 <sup>175</sup>	46.094 <sup>187</sup>	41.75 <sup>138</sup>
Mar. 1.1	54.494 <sup>102</sup>	50.63 <sup>127</sup>	53.032 <sup>92</sup>	39.52 <sup>26</sup>	22.165 <sup>235</sup>	33.81 <sup>209</sup>	45.932 <sup>162</sup>	39.97 <sup>178</sup>
11.1	54.423 <sup>71</sup>	49.36 <sup>127</sup>	52.964 <sup>68</sup>	39.04 <sup>48</sup>	21.986 <sup>179</sup>	31.47 <sup>234</sup>	45.803 <sup>129</sup>	37.82 <sup>215</sup>
21.1	54.387 <sup>36</sup>	48.16 <sup>120</sup>	52.926 <sup>38</sup>	38.31 <sup>73</sup>	21.877 <sup>109</sup>	28.98 <sup>249</sup>	45.713 <sup>90</sup>	35.33 <sup>249</sup>
31.0	54.394 <sup>7</sup>	47.07 <sup>109</sup>	52.922 <sup>4</sup>	37.34 <sup>97</sup>	21.846 <sup>31</sup>	26.44 <sup>254</sup>	45.667 <sup>46</sup>	32.58 <sup>275</sup>
Apr. 10.0	54.447 <sup>53</sup>	46.16 <sup>91</sup>	52.959 <sup>37</sup>	36.13 <sup>121</sup>	21.899 <sup>53</sup>	23.96 <sup>248</sup>	45.671 <sup>4</sup>	29.60 <sup>298</sup>
20.0	54.549 <sup>102</sup>	45.50 <sup>66</sup>	53.038 <sup>79</sup>	34.70 <sup>143</sup>	22.037 <sup>138</sup>	21.64 <sup>232</sup>	45.728 <sup>57</sup>	26.48 <sup>312</sup>
30.0	54.700 <sup>151</sup>	45.13 <sup>37</sup>	53.160 <sup>122</sup>	33.04 <sup>166</sup>	22.260 <sup>223</sup>	19.57 <sup>207</sup>	45.839 <sup>111</sup>	23.24 <sup>324</sup>
May 9.9	54.898 <sup>198</sup>	45.05 <sup>8</sup>	53.325 <sup>165</sup>	31.21 <sup>183</sup>	22.560 <sup>300</sup>	17.84 <sup>134</sup>	46.005 <sup>166</sup>	20.00 <sup>324</sup>
19.9	55.139 <sup>241</sup>	45.31 <sup>26</sup>	53.530 <sup>205</sup>	29.22 <sup>199</sup>	22.933 <sup>373</sup>	16.50 <sup>173</sup>	46.222 <sup>217</sup>	16.80 <sup>320</sup>
29.9	55.416 <sup>277</sup>	45.90 <sup>59</sup>	53.769 <sup>239</sup>	27.11 <sup>211</sup>	23.366 <sup>433</sup>	15.59 <sup>91</sup>	46.486 <sup>264</sup>	13.73 <sup>307</sup>
June 8.8	55.724 <sup>308</sup>	46.80 <sup>90</sup>	54.039 <sup>270</sup>	24.96 <sup>215</sup>	23.848 <sup>482</sup>	15.15 <sup>44</sup>	46.789 <sup>303</sup>	10.83 <sup>290</sup>
18.8	56.054 <sup>330</sup>	48.00 <sup>120</sup>	54.330 <sup>291</sup>	22.80 <sup>216</sup>	24.366 <sup>518</sup>	15.18 <sup>3</sup>	47.126 <sup>337</sup>	8.21 <sup>262</sup>
28.8	56.397 <sup>343</sup>	49.47 <sup>147</sup>	54.638 <sup>308</sup>	20.68 <sup>212</sup>	24.907 <sup>541</sup>	15.70 <sup>52</sup>	47.488 <sup>362</sup>	5.92 <sup>229</sup>
July 8.8	56.745 <sup>348</sup>	51.17 <sup>170</sup>	54.952 <sup>314</sup>	18.66 <sup>202</sup>	25.455 <sup>548</sup>	16.68 <sup>98</sup>	47.865 <sup>377</sup>	4.01 <sup>191</sup>
18.7	57.089 <sup>344</sup>	53.05 <sup>188</sup>	55.265 <sup>313</sup>	16.80 <sup>186</sup>	25.999 <sup>544</sup>	18.10 <sup>142</sup>	48.246 <sup>381</sup>	2.54 <sup>147</sup>
28.7	57.422 <sup>333</sup>	55.06 <sup>201</sup>	55.569 <sup>304</sup>	15.16 <sup>164</sup>	26.526 <sup>527</sup>	19.92 <sup>182</sup>	48.621 <sup>375</sup>	1.55 <sup>99</sup>
Aug. 7.7	57.734 <sup>312</sup>	57.17 <sup>211</sup>	55.858 <sup>289</sup>	13.76 <sup>140</sup>	27.025 <sup>499</sup>	22.11 <sup>219</sup>	48.980 <sup>359</sup>	1.08 <sup>47</sup>
17.7	58.023 <sup>280</sup>	59.30 <sup>213</sup>	56.125 <sup>267</sup>	12.64 <sup>112</sup>	27.486 <sup>461</sup>	24.60 <sup>249</sup>	49.314 <sup>334</sup>	1.12 <sup>4</sup>
27.6	58.281 <sup>258</sup>	61.41 <sup>211</sup>	56.366 <sup>241</sup>	11.84 <sup>80</sup>	27.903 <sup>417</sup>	27.34 <sup>274</sup>	49.616 <sup>302</sup>	1.67 <sup>55</sup>
Sept. 6.6	58.506 <sup>225</sup>	63.48 <sup>207</sup>	56.575 <sup>209</sup>	11.34 <sup>50</sup>	28.268 <sup>365</sup>	30.28 <sup>294</sup>	49.877 <sup>261</sup>	2.71 <sup>104</sup>
16.6	58.697 <sup>191</sup>	65.45 <sup>197</sup>	56.751 <sup>176</sup>	11.17 <sup>17</sup>	28.578 <sup>310</sup>	33.36 <sup>308</sup>	50.093 <sup>216</sup>	4.20 <sup>149</sup>
26.5	58.851 <sup>154</sup>	67.30 <sup>185</sup>	56.892 <sup>141</sup>	11.30 <sup>13</sup>	28.829 <sup>251</sup>	36.51 <sup>315</sup>	50.260 <sup>167</sup>	6.06 <sup>186</sup>
Oct. 6.5	58.968 <sup>117</sup>	68.98 <sup>168</sup>	56.999 <sup>107</sup>	11.70 <sup>40</sup>	29.018 <sup>189</sup>	39.68 <sup>317</sup>	50.378 <sup>118</sup>	8.26 <sup>220</sup>
16.5	59.051 <sup>83</sup>	70.50 <sup>152</sup>	57.072 <sup>73</sup>	12.34 <sup>64</sup>	29.147 <sup>129</sup>	42.80 <sup>312</sup>	50.445 <sup>67</sup>	10.68 <sup>242</sup>
26.5	59.101 <sup>50</sup>	71.82 <sup>132</sup>	57.113 <sup>41</sup>	13.17 <sup>83</sup>	29.214 <sup>67</sup>	45.79 <sup>299</sup>	50.461 <sup>16</sup>	13.21 <sup>253</sup>
Nov. 5.4	59.119 <sup>18</sup>	72.93 <sup>111</sup>	57.124 <sup>11</sup>	14.14 <sup>97</sup>	29.220 <sup>6</sup>	48.62 <sup>283</sup>	50.432 <sup>29</sup>	15.78 <sup>257</sup>
15.4	59.106 <sup>13</sup>	73.82 <sup>89</sup>	57.107 <sup>17</sup>	15.21 <sup>107</sup>	29.166 <sup>54</sup>	51.19 <sup>257</sup>	50.359 <sup>73</sup>	18.26 <sup>248</sup>
25.4	59.067 <sup>39</sup>	74.47 <sup>65</sup>	57.067 <sup>40</sup>	16.32 <sup>111</sup>	29.056 <sup>111</sup>	53.46 <sup>227</sup>	50.249 <sup>110</sup>	20.58 <sup>232</sup>
Dec. 5.4	59.001 <sup>66</sup>	74.88 <sup>41</sup>	57.003 <sup>64</sup>	17.41 <sup>109</sup>	28.892 <sup>164</sup>	55.36 <sup>190</sup>	50.105 <sup>144</sup>	22.60 <sup>203</sup>
15.3	58.913 <sup>88</sup>	75.03 <sup>15</sup>	56.921 <sup>82</sup>	18.46 <sup>105</sup>	28.678 <sup>214</sup>	56.83 <sup>147</sup>	49.935 <sup>170</sup>	24.29 <sup>169</sup>
25.3	58.805 <sup>108</sup>	74.94 <sup>9</sup>	56.823 <sup>98</sup>	19.41 <sup>95</sup>	28.422 <sup>256</sup>	57.83 <sup>100</sup>	49.743 <sup>192</sup>	25.56 <sup>127</sup>
35.3	58.680 <sup>125</sup>	74.59 <sup>35</sup>	56.710 <sup>113</sup>	20.24 <sup>83</sup>	28.133 <sup>289</sup>	58.31 <sup>48</sup>	49.534 <sup>209</sup>	26.39 <sup>83</sup>
Mean Place	54.019	41.37	52.444	40.68	22.443	16.27	45.714	36.23
Sec $\delta$ , Tan $\delta$	1.121	+0.506	1.011	-0.151	1.988	+1.718	1.384	-0.957
$D\psi\alpha$ , $D\omega\alpha$	+0.06	-0.03	+0.06	+0.01	+0.08	-0.11	+0.05	+0.06
$D\psi\delta$ , $D\omega\delta$	+0.4	+0.3	+0.4	+0.3	+0.4	+0.3	+0.4	+0.4



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi$ Piscium. Mag. 5.6			$\upsilon$ Persei. Mag. 3.8			$\alpha$ Eridani. (Achernar.) Mag. 0.6			$\omega$ Cassiopeiæ. Mag. 5.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m l 32	s	" ' +11 43	h m l 32	s	" ' +48 12	h m l 34	s	" ' -57 38	h m l 36	s	" ' +67 37
Jan. 0.3	43.094	110	12.09	54.863	198	50.20	39.082	330	100.04	41	12.35	50.63
10.3	42.984	121	11.49	54.665	217	50.26	38.752	336	100.45	42	11.93	51.19
20.2	42.863	125	10.83	54.448	222	49.88	38.416	332	100.31	44	11.49	51.18
30.2	42.738	125	10.14	54.226	217	49.08	38.084	319	99.61	46	11.03	50.61
Feb. 9.2	42.613	115	9.44	54.009	202	47.89	37.765	293	98.37	41	10.58	49.50
19.2	42.498	100	8.75	53.807	174	46.37	37.472	260	96.63	35	10.17	47.89
Mar. 1.1	42.398	77	8.12	53.633	135	44.59	37.212	217	94.44	29	9.82	45.86
11.1	42.321	47	7.59	53.498	86	42.62	36.995	166	91.84	20	9.53	43.51
21.1	42.274	10	7.19	53.412	30	40.55	36.829	107	88.91	10	9.33	40.92
31.0	42.264	31	6.97	53.382	33	38.45	36.722	42	85.71	1	9.23	38.21
Apr. 10.0	42.295	75	6.94	53.415	100	36.44	36.680	26	82.30	14	9.24	35.48
20.0	42.370	120	7.16	53.515	164	34.60	36.706	97	78.76	23	9.38	32.86
30.0	42.490	165	7.61	53.679	227	33.01	36.803	166	75.16	34	9.61	30.43
May 9.9	42.655	205	8.33	53.906	285	31.72	36.969	235	71.59	43	9.95	28.29
19.9	42.860	242	9.29	54.191	335	30.78	37.204	297	68.14	52	10.38	26.51
29.9	43.102	273	10.50	54.526	375	30.25	37.501	353	64.85	60	10.90	25.15
June 8.9	43.375	298	11.91	54.901	408	30.13	37.854	399	61.82	64	11.50	24.25
18.8	43.673	312	13.51	55.309	427	30.43	38.253	436	59.13	67	12.14	23.84
28.8	43.985	321	15.23	55.736	437	31.14	38.689	460	56.84	69	12.81	23.93
July 8.8	44.306	321	17.05	56.173	435	32.24	39.149	472	55.00	70	13.50	24.51
18.7	44.627	313	18.91	56.608	425	33.70	39.621	470	53.67	68	14.20	25.58
28.7	44.940	298	20.77	57.033	405	35.49	40.091	456	52.89	65	14.88	27.09
Aug. 7.7	45.238	279	22.58	57.438	378	37.57	40.547	428	52.68	61	15.53	29.02
17.7	45.517	252	24.26	57.816	344	39.86	40.975	389	53.04	55	16.14	31.32
27.6	45.769	223	25.84	58.160	306	42.34	41.364	340	53.97	50	16.69	33.95
Sept. 6.6	45.992	193	27.24	58.466	263	44.96	41.704	282	55.42	43	17.19	36.83
16.6	46.185	160	28.45	58.729	219	47.64	41.986	219	57.35	35	17.62	39.94
26.6	46.345	126	29.45	58.948	174	50.34	42.205	148	59.67	28	17.97	43.18
Oct. 6.5	46.471	95	30.23	59.122	128	53.01	42.353	79	62.33	20	18.25	46.50
16.5	46.566	63	30.82	59.250	83	55.60	42.432	9	65.19	11	18.45	49.84
26.5	46.629	33	31.20	59.333	38	58.08	42.441	60	68.16	3	18.56	53.12
Nov. 5.4	46.662	6	31.39	59.371	6	60.37	42.381	122	71.12	5	18.59	56.28
15.4	46.668	21	31.42	59.365	48	62.43	42.259	179	73.95	13	18.54	59.22
25.4	46.647	44	31.29	59.317	89	64.23	42.080	228	76.53	21	18.41	61.89
Dec. 5.4	46.603	68	31.02	59.228	127	65.69	41.852	270	78.78	29	18.20	64.22
15.3	46.535	87	30.64	59.101	160	66.80	41.582	302	80.60	36	17.91	66.11
25.3	46.448	103	30.15	58.941	188	67.52	41.280	323	81.92	40	17.55	67.52
35.3	46.345		29.58	58.753		67.82	40.957		82.71		17.15	68.40
Mean Place	41.751		2.35	53.356		29.27	37.452		89.67		10.410	25.81
Sec $\delta$ , Tan $\delta$	1.021		+0.207	1.500		+1.119	1.869		-1.579		2.628	+2.430
$D\psi\alpha$ , $D\omega\alpha$	+0.06		-0.01	+0.07		-0.07	+0.04		+0.10		+0.09	-0.15
$\eta\delta$ , $D\omega\delta$	+0.4		+0.4	+0.4		+0.4	+0.4		+0.4		+0.4	+0.4

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi$ Piscium. Mag. 4.7			$\phi$ Persei. Mag. 4.2			$\tau$ Ceti. Mag. 3.6			$\circ$ Piscium. Mag. 4.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	1	37	+ 5 4	1	38	+50 16	1	40	-16 21	1	41	+ 8 44
	s		"	s		"	s		"	s		"
Jan. 0.3	7.980		12.38	28.556		37.44	14.065		86.76	1.908		34.14
10.3	7.874	106	11.71	28.346	210	37.60	13.938	127	87.51	1.801	107	33.52
20.2	7.754	120	11.06	28.118	228	37.31	13.802	136	88.03	1.681	120	32.87
30.2	7.630	124	10.44	27.882	236	36.58	13.662	140	88.27	1.555	126	32.22
Feb. 9.2	7.507	123	9.89	27.649	233	35.46	13.523	139	88.24	1.429	126	31.59
		116			217			131			118	
19.2	7.391		9.42	27.432		33.97	13.392		87.91	1.311		31.01
Mar. 1.1	7.290	101	9.07	27.241	191	32.18	13.278	114	87.30	1.205	106	30.51
11.1	7.210	80	8.86	27.091	150	30.19	13.185	93	86.43	1.123	82	30.12
21.1	7.160	50	8.81	26.992	99	28.06	13.122	63	85.27	1.068	55	29.89
31.0	7.145	15	8.97	26.953	39	25.91	13.094	28	83.86	1.050	18	29.83
		24			24			11			23	
Apr. 10.0	7.169		9.34	26.977		23.82	13.105		82.19	1.073		29.98
20.0	7.237	68	9.95	27.070	93	21.87	13.160	55	80.30	1.138	65	30.35
30.0	7.350	113	10.79	27.231	161	20.16	13.259	99	78.21	1.249	111	30.98
May 9.9	7.505	155	11.87	27.458	227	18.74	13.403	144	75.98	1.404	155	31.83
19.9	7.702	197	13.17	27.746	288	17.68	13.588	185	73.63	1.601	197	32.93
		232			341			223			234	
29.9	7.934		14.65	28.087		17.01	13.811		71.21	1.835		34.25
June 8.9	8.199	265	16.33	28.471	384	16.75	14.068	257	68.79	2.101	266	35.75
18.8	8.488	269	18.11	28.888	417	16.92	14.350	282	66.42	2.391	290	37.42
28.8	8.795	307	19.97	29.329	441	17.51	14.651	301	64.15	2.699	308	39.19
July 8.8	9.110	315	21.89	29.780	451	18.50	14.962	311	62.07	3.016	317	41.02
		316			451			315			318	
18.7	9.426		23.76	30.231		19.86	15.277		60.21	3.334		42.87
28.7	9.733	307	25.57	30.672	441	21.58	15.585	308	58.62	3.646	312	44.69
Aug. 7.7	10.030	297	27.25	31.095	423	23.59	15.881	296	57.36	3.945	299	46.48
17.7	10.306	276	28.77	31.490	395	25.84	16.158	277	56.43	4.225	280	48.03
27.6	10.557	251	30.10	31.852	362	28.30	16.410	262	55.88	4.480	255	49.47
		222			323			222			229	
Sept. 6.6	10.779		31.21	32.175		30.92	16.632		55.71	4.709		50.72
16.6	10.972	193	32.08	32.456	281	33.62	16.822	190	55.91	4.906	197	51.77
26.6	11.132	160	32.70	32.691	235	36.36	16.976	154	56.44	5.072	166	52.60
Oct. 6.5	11.260	128	33.10	32.880	189	39.10	17.096	120	57.28	5.206	134	53.19
16.5	11.356	96	33.26	33.021	141	41.78	17.180	84	58.39	5.308	102	53.58
		64			94			51			70	
26.5	11.420		33.22	33.115		44.34	17.231		59.68	5.378		53.75
Nov. 5.4	11.455	35	33.00	33.161	46	46.75	17.250	19	61.11	5.420	42	53.76
15.4	11.463	8	32.64	33.161	0	48.93	17.238	12	62.61	5.433	13	53.61
25.4	11.444	19	32.16	33.116	45	50.85	17.199	39	64.11	5.419	14	53.31
Dec. 5.4	11.402	42	31.60	33.027	89	52.44	17.135	64	65.54	5.382	37	52.90
		65			130			86			62	
15.3	11.337		30.96	32.897		53.68	17.049		66.84	5.320		52.41
25.3	11.253	84	30.29	32.730	167	54.52	16.943	106	67.97	5.238	82	51.85
35.3	11.152	101	29.60	32.534	196	54.93	16.821	122	68.90	5.137	101	51.23
Mean Place	6.617		4.95	26.963		16.10	12.695		86.83	0.516		25.46
Sec $\delta$ , Tan $\delta$	1.004		+0.089	1.565		+1.203	1.042		-0.294	1.012		+0.154
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06		-0.01	+0.07		-0.07	+0.06		+0.02	+0.06		-0.01
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.4		+0.4	+0.4		+0.4	+0.4		+0.4	+0.4		+0.4

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Sculptoris. Mag. 5.4		$\zeta$ Ceti. Mag. 3.9		$\alpha$ Trianguli. Mag. 3.6		$\epsilon$ Cassiopeiæ. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 41	° ' " -25 27	h m 1 47	° ' " -10 44	h m 1 48	° ' " +29 10	h m 1 48	° ' " +63 15
	s	"	s	"	s	"	s	"
Jan. 0.3	46.709	63.43	23.205	38.36	22.253	45.45	26.49	67.01
10.3	46.568	64.24	23.090	39.18	22.125	45.19	26.16	67.60
20.2	46.418	64.72	22.963	39.80	21.983	44.69	25.80	67.66
30.2	46.264	64.84	22.831	40.22	21.831	43.96	25.43	67.18
Feb. 9.2	46.111	64.61	22.698	40.41	21.678	43.05	25.06	66.18
19.2	45.966	64.03	22.570	40.37	21.532	41.97	24.71	64.72
Mar. 1.1	45.838	63.11	22.457	40.08	21.401	40.76	24.40	62.85
11.1	45.733	61.86	22.364	39.54	21.297	39.50	24.14	60.65
21.1	45.659	60.28	22.299	38.75	21.227	38.25	23.96	58.23
31.1	45.621	58.44	22.267	37.71	21.198	37.08	23.87	55.68
Apr. 10.0	45.624	56.34	22.275	36.42	21.215	36.03	23.86	53.10
20.0	45.671	54.02	22.324	34.90	21.282	35.17	23.95	50.61
30.0	45.764	51.53	22.419	33.17	21.401	34.55	24.14	48.29
May 9.9	45.905	48.91	22.557	31.25	21.570	34.20	24.41	46.25
19.9	46.090	46.22	22.738	29.19	21.786	34.15	24.78	44.54
29.9	46.315	43.51	22.957	27.01	22.045	34.41	25.22	43.23
June 8.9	46.576	40.86	23.209	24.79	22.338	34.98	25.71	42.35
18.8	46.865	38.34	23.487	22.56	22.659	35.86	26.26	41.94
28.8	47.176	35.98	23.784	20.40	23.000	37.02	26.84	42.00
July 8.8	47.498	33.87	24.094	18.34	23.352	38.41	27.44	42.53
18.8	47.826	32.06	24.408	16.44	23.704	40.02	28.04	43.52
28.7	48.150	30.60	24.716	14.78	24.052	41.78	28.64	44.94
Aug. 7.7	48.402	29.52	25.014	13.37	24.386	43.66	29.22	46.74
17.7	48.756	28.86	25.295	12.27	24.699	45.61	29.76	48.91
27.6	49.023	28.64	25.552	11.50	24.988	47.59	30.27	51.39
Sept. 6.6	49.262	28.85	25.783	11.07	25.247	49.56	30.72	54.10
16.6	49.465	29.47	25.982	10.97	25.474	51.47	31.12	57.02
26.6	49.631	30.48	26.148	11.21	25.669	53.29	31.44	60.09
Oct. 6.5	49.760	31.80	26.282	11.74	25.828	55.00	31.71	63.23
16.5	49.851	33.40	26.382	12.54	25.952	56.56	31.92	66.38
26.5	49.905	35.18	26.449	13.54	26.043	57.97	32.06	69.48
Nov. 5.5	49.924	37.08	26.486	14.70	26.100	59.19	32.12	72.46
15.4	49.909	39.02	26.494	15.96	26.124	60.23	32.12	75.27
25.4	49.864	40.91	26.473	17.25	26.117	61.06	32.05	77.82
Dec. 5.4	49.791	42.68	26.427	18.52	26.079	61.66	31.89	80.04
15.3	49.694	44.24	26.357	19.73	26.012	62.04	31.69	81.89
25.3	49.576	45.57	26.268	20.82	25.918	62.16	31.43	83.28
35.3	49.441	46.61	26.160	21.77	25.800	62.03	31.12	84.16
Mean Place	45.290	60.82	21.784	40.43	20.746	30.12	24.487	43.20
Sec $\delta$ , Tan $\delta$	1.108	-0.476	1.018	-0.190	1.145	+0.558	2.223	+1.985
$D\psi\alpha$ , $D\omega\alpha$	+0.06	+0.03	+0.06	+0.01	+0.07	-0.03	+0.08	-0.12
$D\psi\delta$ , $D\omega\delta$	+0.4	+0.4	+0.4	+0.5	+0.4	+0.5	+0.4	+0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\xi$ Piscium. Mag. 4.8			$\beta$ Arietis. Mag. 2.7			$\psi$ Phœnicis. Mag. 4.4			$\nu$ Ceti. Mag. 4.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 1 49	s	° ' " + 2 46	h m 1 50	s	° ' " +20 24	h m 1 50	s	° ' " -46 41	h m 1 56	s	° ' " -21 28
Jan. 0.3	16.855	105	48.36 69	4.536	113	22.54 41	20.591	230	100.86 77	7.101	130	47.42 92
10.3	16.750	119	47.67 65	4.423	128	22.13 57	20.361	240	101.63 27	6.971	143	48.34 60
20.2	16.631	126	47.02 59	4.295	137	21.56 71	20.121	244	101.90 25	6.828	150	48.94 29
30.2	16.505	128	46.43 51	4.158	138	20.85 80	19.877	240	101.65 75	6.678	151	49.23 3
Feb. 9.2	16.377	123	45.92 39	4.020	133	20.05 88	19.637	226	100.90 123	6.527	145	49.20 36
19.2	16.254	109	45.53 25	3.887	118	19.17 91	19.411	204	99.67 168	6.382	133	48.84 69
Mar. 1.1	16.145	90	45.28 11	3.769	97	18.26 89	19.207	176	97.99 208	6.249	111	48.15 100
11.1	16.055	61	45.17 7	3.672	65	17.37 83	19.031	136	95.91 245	6.138	84	47.15 131
21.1	15.994	27	45.24 28	3.607	27	16.54 71	18.895	90	93.46 301	6.054	49	45.84 166
31.1	15.967	12	45.52 49	3.580	15	15.83 55	18.805	40	90.71 301	6.005	9	44.24 186
Apr. 10.0	15.979	55	46.01 72	3.595	62	15.28 35	18.765	15	87.70 318	5.996	34	42.39 209
20.0	16.034	100	46.73 95	3.657	110	14.93 11	18.780	73	84.52 331	6.030	80	40.30 228
30.0	16.134	143	47.68 119	3.767	157	14.82 16	18.853	131	81.21 336	6.110	126	38.02 243
May 9.9	16.277	184	48.87 138	3.924	202	14.98 42	18.984	188	77.85 334	6.236	171	35.59 253
19.9	16.461	224	50.25 158	4.126	241	15.40 71	19.172	239	74.51 324	6.407	211	33.06 259
29.9	16.685	256	51.83 172	4.367	275	16.11 96	19.411	286	71.27 305	6.618	248	30.47 256
June 8.9	16.941	281	53.55 183	4.642	302	17.07 120	19.697	325	68.22 281	6.866	276	27.91 260
18.8	17.222	300	55.38 189	4.944	321	18.27 141	20.022	356	65.41 248	7.142	300	25.41 236
28.8	17.522	311	57.27 191	5.265	331	19.68 159	20.378	377	62.93 209	7.442	314	23.05 215
July 8.8	17.833	314	59.18 186	5.596	333	21.27 170	20.755	389	60.84 165	7.756	320	20.90 190
18.8	18.147	310	61.04 177	5.929	329	22.97 178	21.144	389	59.19 116	8.076	320	19.00 158
28.7	18.457	297	62.81 162	6.258	316	24.75 182	21.533	380	58.03 63	8.396	307	17.42 122
Aug. 7.7	18.754	280	64.43 145	6.574	297	26.57 181	21.913	360	57.40 10	8.703	293	16.20 84
17.7	19.034	257	65.88 123	6.871	274	28.38 176	22.273	332	57.30 46	8.996	271	15.36 42
27.6	19.291	232	67.11 100	7.145	246	30.14 165	22.605	295	57.76 98	9.267	243	14.94 2
Sept. 6.6	19.523	201	68.11 74	7.391	215	31.79 155	22.900	252	58.74 147	9.510	212	14.92 40
16.6	19.724	170	68.85 49	7.606	185	33.34 140	23.152	204	60.21 189	9.722	177	15.32 78
26.6	19.894	139	69.34 23	7.791	151	34.74 123	23.356	153	62.10 226	9.899	143	16.10 112
Oct. 6.5	20.033	107	69.57 1	7.942	118	35.97 106	23.509	100	64.36 253	10.042	107	17.22 139
16.5	20.140	76	69.58 20	8.060	87	37.03 88	23.609	48	66.89 270	10.149	71	18.61 160
26.5	20.216	48	69.38 38	8.147	56	37.91 69	23.657	5	69.59 276	10.220	37	20.21 175
Nov. 5.5	20.264	18	69.00 51	8.203	26	38.60 52	23.652	51	72.35 271	10.257	6	21.96 182
15.4	20.282	8	68.49 62	8.229	3	39.12 35	23.601	95	75.06 255	10.263	26	23.78 180
25.4	20.274	35	67.87 69	8.226	32	39.47 16	23.506	136	77.61 231	10.237	54	25.58 172
Dec. 5.4	20.239	57	67.18 74	8.194	58	39.63 1	23.370	171	79.92 196	10.183	81	27.30 156
15.3	20.182	81	66.44 75	8.136	83	39.62 18	23.199	200	81.88 155	10.102	102	28.86 136
25.3	20.101	98	65.69 74	8.053	105	39.44 34	22.999	221	83.43 110	10.000	123	30.22 111
35.3	20.003		64.95	7.948		39.10	22.778		84.53	9.877		31.33
Mean Place	15.422		41.75	3.057		10.04	19.001		92.87	5.618		46.13
Sec $\delta$ , Tan $\delta$	1.001		+0.049	1.067		+0.372	1.458		-1.062	1.075		-0.393
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06		0.00	+0.07		-0.02	+0.05		+0.06	+0.06		+0.02
$D_{\psi} \delta$ , $D_{\omega} \delta$	+0.4		+0.5	+0.4		+0.5	+0.4		+0.5	+0.3		+0.5



## FOR THE UPPER TRANSIT AT WASHINGTON

Washington Mean Time.	$\alpha$ Hydri. Mag. 3.0		50 Cassiopeiæ. Mag. 4.1		$\gamma$ Andromedæ <i>pr.</i> Mag. 2.3		$\alpha$ Arietis. Mag. 2.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 1 56	" ' " -61 57	h m 1 56	" ' " +72 1	h m 1 58	" ' " +41 55	h m 2 2	" ' " +23 4
	s	"	s	"	s	"	s	"
Jan. 0.3	10.74	94.94	21.69	38.40	49.563	74.24	31.005	27.18
10.3	10.35	95.59	21.17	39.32	49.404	74.37	30.892	26.85
20.3	9.94	95.65	20.60	39.66	49.225	74.13	30.762	26.36
30.2	9.53	95.13	20.01	39.42	49.033	73.54	30.621	25.71
Feb. 9.2	9.13	94.05	19.43	38.60	48.837	72.62	30.476	24.93
19.2	8.76	92.44	18.88	37.24	48.648	71.40	30.333	24.05
Mar. 1.1	8.42	90.35	18.38	35.40	48.478	69.95	30.203	23.10
11.1	8.12	87.83	17.98	33.17	48.337	68.32	30.096	22.14
21.1	7.87	84.94	17.67	30.63	48.236	66.59	30.019	21.21
31.1	7.70	81.75	17.48	27.91	48.184	64.84	29.979	20.36
Apr. 10.0	7.59	78.33	17.41	25.10	48.187	63.15	29.982	19.66
20.0	7.55	74.74	17.50	22.32	48.247	61.58	30.032	19.14
30.0	7.60	71.09	17.72	19.68	48.367	60.22	30.131	18.85
May 10.0	7.74	67.43	18.06	17.27	48.547	59.13	30.279	18.80
19.9	7.95	63.86	18.54	15.18	48.782	58.36	30.474	19.03
29.9	8.23	60.45	19.12	13.47	49.066	57.91	30.709	19.52
June 8.9	8.58	57.29	19.79	12.19	49.392	57.83	30.981	20.29
18.8	8.98	54.44	20.53	11.39	49.752	58.12	31.282	21.31
28.8	9.44	51.99	21.33	11.08	50.135	58.76	31.603	22.56
July 8.8	9.93	49.99	22.15	11.27	50.532	59.74	31.937	23.99
18.8	10.44	48.51	22.99	11.96	50.934	61.04	32.276	25.59
28.7	10.96	47.59	23.83	13.12	51.330	62.62	32.611	27.29
Aug. 7.7	11.47	47.24	24.64	14.73	51.715	64.43	32.936	29.05
17.7	11.96	47.48	25.41	16.75	52.079	66.43	33.244	30.83
27.7	12.42	48.31	26.13	19.13	52.417	68.59	33.530	32.59
Sept. 6.6	12.82	49.70	26.78	21.84	52.723	70.84	33.789	34.28
16.6	13.17	51.61	27.35	24.81	52.994	73.14	34.020	35.87
26.6	13.44	53.94	27.83	27.98	53.229	75.45	34.220	37.35
Oct. 6.5	13.64	56.65	28.23	31.28	53.424	77.74	34.387	38.69
16.5	13.76	59.60	28.54	34.66	53.580	79.95	34.522	39.86
26.5	13.81	62.70	28.74	38.05	53.696	82.04	34.625	40.87
Nov. 5.5	13.77	65.82	28.82	41.36	53.771	84.00	34.696	41.72
15.4	13.65	68.83	28.81	44.52	53.807	85.78	31.736	42.38
25.4	13.46	71.64	28.68	47.44	53.804	87.32	34.744	42.88
Dec. 5.4	13.21	74.11	28.46	50.06	53.761	88.60	34.723	43.19
15.4	12.91	76.17	28.14	52.28	53.681	89.60	34.674	43.32
25.3	12.56	77.74	27.72	54.05	53.566	90.27	34.596	43.28
35.3	12.18	78.76	27.24	55.30	53.422	90.60	34.495	43.04
Mean Place	8.844	84.38	19.026	13.50	47.863	55.46	29.429	13.99
Sec $\delta$ , Tan $\delta$	2.128	-1.879	3.240	+3.082	1.344	+0.898	1.087	+0.426
$D\psi\alpha$ , $D\omega\alpha$	+0.04	+0.11	+0.10	-0.18	+0.07	-0.05	+0.07	-0.02
$D\psi\delta$ , $D\omega\delta$	+0.3	+0.5	+0.3	+0.5	+0.3	+0.5	+0.3	-0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Trianguli. Mag. 3.1		55 Cassiopeiæ. Mag. 6.2		6 Persei. Mag. 5.4		$\xi^1$ Ceti. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 4	° ' " +34 35	h m 2 7	° ' " +66 8	h m 2 8	° ' " +50 40	h m 2 8	° ' " + 8 27
	s	"	s	"	s	"	s	"
Jan. 0.3	37.638	59.59	59.43	33.94	6.488	71.92	37.464	36.46
10.3	37.506 <sup>132</sup>	59.57 <sup>2</sup>	59.07 <sup>36</sup>	34.83 <sup>89</sup>	6.294 <sup>194</sup>	72.37 <sup>45</sup>	37.364 <sup>100</sup>	35.85 <sup>61</sup>
20.3	37.353 <sup>153</sup>	59.26 <sup>31</sup>	58.67 <sup>40</sup>	35.18 <sup>35</sup>	6.072 <sup>222</sup>	72.39 <sup>2</sup>	37.245 <sup>119</sup>	35.23 <sup>62</sup>
30.2	37.186 <sup>167</sup>	58.66 <sup>60</sup>	58.24 <sup>43</sup>	34.99 <sup>19</sup>	5.832 <sup>240</sup>	71.97 <sup>42</sup>	37.116 <sup>129</sup>	34.61 <sup>62</sup>
Feb. 9.2	37.015 <sup>171</sup>	57.82 <sup>84</sup>	57.81 <sup>43</sup>	34.26 <sup>73</sup>	5.588 <sup>244</sup>	71.13 <sup>84</sup>	36.982 <sup>134</sup>	34.03 <sup>58</sup>
19.2	36.849 <sup>166</sup>	56.75 <sup>107</sup>	57.40 <sup>41</sup>	33.02 <sup>124</sup>	5.351 <sup>237</sup>	69.92 <sup>121</sup>	36.850 <sup>132</sup>	33.49 <sup>54</sup>
Mar. 1.1	36.697 <sup>152</sup>	55.49 <sup>126</sup>	57.02 <sup>38</sup>	31.33 <sup>169</sup>	5.135 <sup>216</sup>	68.38 <sup>154</sup>	36.729 <sup>121</sup>	33.03 <sup>46</sup>
11.1	36.570 <sup>127</sup>	54.13 <sup>136</sup>	56.70 <sup>32</sup>	29.25 <sup>208</sup>	4.953 <sup>182</sup>	66.60 <sup>178</sup>	36.625 <sup>104</sup>	32.68 <sup>35</sup>
21.1	36.478 <sup>92</sup>	52.71 <sup>142</sup>	56.47 <sup>23</sup>	26.91 <sup>234</sup>	4.816 <sup>137</sup>	64.62 <sup>197</sup>	36.548 <sup>77</sup>	32.47 <sup>21</sup>
31.1	36.428 <sup>50</sup>	51.30 <sup>141</sup>	56.31 <sup>16</sup>	24.36 <sup>255</sup>	4.735 <sup>81</sup>	62.55 <sup>208</sup>	36.503 <sup>45</sup>	32.41 <sup>8</sup>
Apr. 10.0	36.426 <sup>2</sup>	49.98 <sup>132</sup>	56.25 <sup>6</sup>	21.73 <sup>263</sup>	4.717 <sup>18</sup>	60.47 <sup>208</sup>	36.498 <sup>5</sup>	32.56 <sup>15</sup>
20.0	36.478 <sup>52</sup>	48.81 <sup>117</sup>	56.30 <sup>5</sup>	19.14 <sup>259</sup>	4.768 <sup>61</sup>	58.48 <sup>199</sup>	36.536 <sup>38</sup>	32.90 <sup>34</sup>
30.0	36.584 <sup>106</sup>	47.84 <sup>97</sup>	56.45 <sup>15</sup>	16.67 <sup>247</sup>	4.888 <sup>120</sup>	56.65 <sup>183</sup>	36.620 <sup>84</sup>	33.47 <sup>57</sup>
May 10.0	36.744 <sup>160</sup>	47.13 <sup>71</sup>	56.72 <sup>27</sup>	14.41 <sup>226</sup>	5.078 <sup>190</sup>	55.08 <sup>157</sup>	36.749 <sup>129</sup>	34.28 <sup>81</sup>
19.9	36.955 <sup>211</sup>	46.70 <sup>43</sup>	57.07 <sup>35</sup>	12.45 <sup>196</sup>	5.331 <sup>253</sup>	53.79 <sup>129</sup>	36.921 <sup>172</sup>	35.30 <sup>102</sup>
29.9	37.213 <sup>258</sup>	46.59 <sup>11</sup>	57.52 <sup>45</sup>	10.85 <sup>160</sup>	5.644 <sup>313</sup>	52.85 <sup>94</sup>	37.133 <sup>212</sup>	36.54 <sup>124</sup>
June 8.9	37.510 <sup>297</sup>	46.81 <sup>22</sup>	58.04 <sup>52</sup>	9.66 <sup>119</sup>	6.007 <sup>363</sup>	52.30 <sup>55</sup>	37.380 <sup>247</sup>	37.95 <sup>141</sup>
18.8	37.838 <sup>328</sup>	47.34 <sup>53</sup>	58.61 <sup>57</sup>	8.92 <sup>74</sup>	6.409 <sup>402</sup>	52.13 <sup>17</sup>	37.655 <sup>275</sup>	39.51 <sup>156</sup>
28.8	38.190 <sup>352</sup>	48.19 <sup>85</sup>	59.23 <sup>62</sup>	8.64 <sup>28</sup>	6.841 <sup>432</sup>	52.38 <sup>25</sup>	37.953 <sup>298</sup>	41.20 <sup>169</sup>
July 8.8	38.555 <sup>365</sup>	49.32 <sup>113</sup>	59.89 <sup>66</sup>	8.83 <sup>19</sup>	7.292 <sup>451</sup>	53.01 <sup>63</sup>	38.263 <sup>310</sup>	42.94 <sup>174</sup>
18.8	38.926 <sup>371</sup>	50.70 <sup>138</sup>	60.55 <sup>66</sup>	9.49 <sup>66</sup>	7.751 <sup>459</sup>	54.02 <sup>101</sup>	38.579 <sup>316</sup>	44.70 <sup>176</sup>
28.7	39.293 <sup>367</sup>	52.30 <sup>160</sup>	61.21 <sup>66</sup>	10.59 <sup>110</sup>	8.207 <sup>456</sup>	55.36 <sup>134</sup>	38.893 <sup>314</sup>	46.42 <sup>172</sup>
Aug. 7.7	39.649 <sup>356</sup>	54.06 <sup>176</sup>	61.86 <sup>65</sup>	12.12 <sup>153</sup>	8.649 <sup>442</sup>	57.03 <sup>167</sup>	39.198 <sup>305</sup>	48.06 <sup>164</sup>
17.7	39.988 <sup>339</sup>	55.95 <sup>189</sup>	62.48 <sup>62</sup>	14.02 <sup>190</sup>	9.073 <sup>424</sup>	58.97 <sup>194</sup>	39.490 <sup>292</sup>	49.59 <sup>153</sup>
27.7	40.303 <sup>315</sup>	57.93 <sup>198</sup>	63.06 <sup>58</sup>	16.26 <sup>224</sup>	9.468 <sup>395</sup>	61.14 <sup>217</sup>	39.762 <sup>272</sup>	50.96 <sup>137</sup>
Sept. 6.6	40.590 <sup>287</sup>	59.95 <sup>202</sup>	63.60 <sup>54</sup>	18.80 <sup>254</sup>	9.830 <sup>362</sup>	63.47 <sup>233</sup>	40.008 <sup>246</sup>	52.13 <sup>117</sup>
16.6	40.845 <sup>255</sup>	61.98 <sup>203</sup>	64.07 <sup>47</sup>	21.58 <sup>278</sup>	10.152 <sup>322</sup>	65.94 <sup>247</sup>	40.227 <sup>219</sup>	53.10 <sup>97</sup>
26.6	41.067 <sup>222</sup>	63.96 <sup>198</sup>	64.48 <sup>41</sup>	24.54 <sup>296</sup>	10.435 <sup>283</sup>	68.51 <sup>257</sup>	40.418 <sup>191</sup>	53.84 <sup>74</sup>
Oct. 6.5	41.255 <sup>188</sup>	65.87 <sup>191</sup>	64.83 <sup>35</sup>	27.64 <sup>310</sup>	10.672 <sup>237</sup>	71.09 <sup>258</sup>	40.578 <sup>160</sup>	54.37 <sup>53</sup>
16.5	41.406 <sup>151</sup>	67.69 <sup>182</sup>	65.10 <sup>27</sup>	30.79 <sup>315</sup>	10.864 <sup>192</sup>	73.66 <sup>257</sup>	40.708 <sup>130</sup>	54.67 <sup>30</sup>
26.5	41.521 <sup>115</sup>	69.37 <sup>168</sup>	65.29 <sup>19</sup>	33.94 <sup>315</sup>	11.009 <sup>145</sup>	76.17 <sup>251</sup>	40.806 <sup>98</sup>	54.78 <sup>11</sup>
Nov. 5.5	41.601 <sup>80</sup>	70.90 <sup>153</sup>	65.41 <sup>12</sup>	37.02 <sup>308</sup>	11.106 <sup>97</sup>	78.57 <sup>240</sup>	40.875 <sup>69</sup>	54.72 <sup>6</sup>
15.4	41.646 <sup>45</sup>	72.26 <sup>136</sup>	65.45 <sup>4</sup>	39.97 <sup>295</sup>	11.154 <sup>48</sup>	80.81 <sup>224</sup>	40.915 <sup>40</sup>	54.49 <sup>23</sup>
25.4	41.654 <sup>8</sup>	73.41 <sup>115</sup>	65.41 <sup>4</sup>	42.72 <sup>275</sup>	11.153 <sup>1</sup>	82.81 <sup>200</sup>	40.925 <sup>10</sup>	54.14 <sup>35</sup>
Dec. 5.4	41.627 <sup>27</sup>	74.35 <sup>94</sup>	65.28 <sup>13</sup>	45.17 <sup>245</sup>	11.104 <sup>49</sup>	84.56 <sup>175</sup>	40.908 <sup>17</sup>	53.70 <sup>44</sup>
15.4	41.567 <sup>60</sup>	75.02 <sup>67</sup>	65.07 <sup>21</sup>	47.26 <sup>209</sup>	11.010 <sup>94</sup>	86.01 <sup>145</sup>	40.865 <sup>43</sup>	53.18 <sup>52</sup>
25.3	41.476 <sup>91</sup>	75.44 <sup>42</sup>	64.80 <sup>27</sup>	48.94 <sup>168</sup>	10.871 <sup>139</sup>	87.08 <sup>107</sup>	40.796 <sup>69</sup>	52.60 <sup>58</sup>
35.3	41.355 <sup>121</sup>	75.57 <sup>13</sup>	64.47 <sup>33</sup>	50.13 <sup>119</sup>	10.694 <sup>177</sup>	87.76 <sup>68</sup>	40.706 <sup>90</sup>	51.98 <sup>62</sup>
Mean Place	35.965	42.98	56.952	10.27	4.556	51.26	35.910	28.09
Sec $\delta$ , Tan $\delta$	1.215	+0.690	2.472	+2.261	1.578	+1.221	1.011	+0.149
$D\psi \alpha$ , $D_\omega \alpha$	+0.07	-0.04	+0.09	-0.13	+0.08	-0.07	+0.06	-0.01
$D\psi \delta$ , $D_\omega \delta$	+0.3	+0.5	+0.3	+0.5	+0.3	+0.5	+0.3	+0.5



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Fornacis. Mag. 5.2		$\gamma$ Trianguli. Mag. 4.1		$\delta$ Ceti. Mag. 5.7		$\phi$ Eridani. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 9	° ' " -31 6	h m 2 12	° ' " +33 27	h m 2 12	° ' " - 6 47	h m 2 13	° ' " -51 53
	s	"	s	"	s	"	s	"
Jan. 0.3	16.491 <sup>153</sup>	50.96 <sup>103</sup>	24.214 <sup>127</sup>	66.32 <sup>0</sup>	52.088 <sup>105</sup>	71.66 <sup>88</sup>	34.352 <sup>266</sup>	54.43 <sup>101</sup>
10.3	16.338 <sup>169</sup>	51.99 <sup>64</sup>	24.087 <sup>147</sup>	66.32 <sup>28</sup>	51.983 <sup>122</sup>	72.54 <sup>71</sup>	34.086 <sup>283</sup>	55.44 <sup>46</sup>
20.3	16.169 <sup>177</sup>	52.63 <sup>24</sup>	23.940 <sup>164</sup>	66.04 <sup>54</sup>	51.861 <sup>133</sup>	73.25 <sup>55</sup>	33.803 <sup>293</sup>	55.90 <sup>7</sup>
30.2	15.992 <sup>181</sup>	52.87 <sup>17</sup>	23.776 <sup>170</sup>	65.50 <sup>79</sup>	51.728 <sup>139</sup>	73.80 <sup>35</sup>	33.510 <sup>292</sup>	55.83 <sup>61</sup>
Feb. 9.2	15.811 <sup>176</sup>	52.70 <sup>58</sup>	23.606 <sup>166</sup>	64.71 <sup>100</sup>	51.589 <sup>137</sup>	74.15 <sup>14</sup>	33.218 <sup>283</sup>	55.22 <sup>113</sup>
19.2	15.635 <sup>162</sup>	52.12 <sup>96</sup>	23.440 <sup>155</sup>	63.71 <sup>118</sup>	51.452 <sup>128</sup>	74.29 <sup>6</sup>	32.935 <sup>262</sup>	54.09 <sup>161</sup>
Mar. 1.2	15.473 <sup>142</sup>	51.16 <sup>134</sup>	23.285 <sup>130</sup>	62.53 <sup>128</sup>	51.324 <sup>109</sup>	74.23 <sup>30</sup>	32.673 <sup>233</sup>	52.48 <sup>205</sup>
11.1	15.331 <sup>112</sup>	49.82 <sup>168</sup>	23.155 <sup>100</sup>	61.25 <sup>134</sup>	51.215 <sup>86</sup>	73.93 <sup>52</sup>	32.440 <sup>193</sup>	50.43 <sup>246</sup>
21.1	15.219 <sup>77</sup>	48.14 <sup>201</sup>	23.055 <sup>57</sup>	59.91 <sup>134</sup>	51.129 <sup>53</sup>	73.41 <sup>77</sup>	32.247 <sup>146</sup>	47.97 <sup>278</sup>
31.1	15.142 <sup>35</sup>	46.13 <sup>228</sup>	22.998 <sup>10</sup>	58.57 <sup>125</sup>	51.076 <sup>15</sup>	72.64 <sup>100</sup>	32.101 <sup>91</sup>	45.19 <sup>307</sup>
Apr. 10.0	15.107 <sup>9</sup>	43.85 <sup>252</sup>	22.988 <sup>42</sup>	57.32 <sup>111</sup>	51.061 <sup>27</sup>	71.64 <sup>124</sup>	32.010 <sup>33</sup>	42.12 <sup>327</sup>
20.0	15.116 <sup>59</sup>	41.33 <sup>271</sup>	23.030 <sup>97</sup>	56.21 <sup>93</sup>	51.038 <sup>71</sup>	70.40 <sup>146</sup>	31.977 <sup>30</sup>	38.85 <sup>342</sup>
30.0	15.175 <sup>108</sup>	38.62 <sup>283</sup>	23.127 <sup>149</sup>	55.28 <sup>67</sup>	51.159 <sup>116</sup>	68.94 <sup>167</sup>	32.007 <sup>96</sup>	35.43 <sup>348</sup>
May 10.0	15.283 <sup>157</sup>	35.79 <sup>291</sup>	23.276 <sup>202</sup>	54.61 <sup>41</sup>	51.275 <sup>159</sup>	67.27 <sup>183</sup>	32.103 <sup>158</sup>	31.95 <sup>347</sup>
19.9	15.440 <sup>201</sup>	32.88 <sup>292</sup>	23.478 <sup>247</sup>	54.20 <sup>10</sup>	51.434 <sup>199</sup>	65.44 <sup>196</sup>	32.261 <sup>218</sup>	28.48 <sup>339</sup>
29.9	15.641 <sup>242</sup>	29.96 <sup>285</sup>	23.725 <sup>286</sup>	54.10 <sup>23</sup>	51.633 <sup>234</sup>	63.48 <sup>206</sup>	32.479 <sup>273</sup>	25.09 <sup>321</sup>
June 8.9	15.883 <sup>276</sup>	27.11 <sup>273</sup>	24.011 <sup>321</sup>	54.32 <sup>51</sup>	51.867 <sup>265</sup>	61.42 <sup>210</sup>	32.752 <sup>321</sup>	21.88 <sup>297</sup>
18.9	16.159 <sup>302</sup>	24.38 <sup>252</sup>	24.332 <sup>346</sup>	54.83 <sup>83</sup>	52.132 <sup>286</sup>	59.32 <sup>209</sup>	33.073 <sup>362</sup>	18.91 <sup>265</sup>
28.8	16.461 <sup>321</sup>	21.86 <sup>225</sup>	24.678 <sup>359</sup>	55.66 <sup>108</sup>	52.418 <sup>302</sup>	57.23 <sup>202</sup>	33.435 <sup>390</sup>	16.26 <sup>224</sup>
July 8.8	16.782 <sup>332</sup>	19.61 <sup>192</sup>	25.037 <sup>366</sup>	56.74 <sup>132</sup>	52.720 <sup>309</sup>	55.21 <sup>189</sup>	33.825 <sup>409</sup>	14.02 <sup>181</sup>
18.8	17.114 <sup>335</sup>	17.69 <sup>154</sup>	25.403 <sup>365</sup>	58.06 <sup>154</sup>	53.029 <sup>309</sup>	53.32 <sup>171</sup>	34.234 <sup>418</sup>	12.21 <sup>129</sup>
28.7	17.449 <sup>328</sup>	16.15 <sup>111</sup>	25.768 <sup>354</sup>	59.60 <sup>171</sup>	53.338 <sup>301</sup>	51.61 <sup>150</sup>	34.652 <sup>415</sup>	10.92 <sup>74</sup>
Aug. 7.7	17.077 <sup>313</sup>	15.04 <sup>65</sup>	26.122 <sup>338</sup>	61.31 <sup>181</sup>	53.639 <sup>288</sup>	50.11 <sup>122</sup>	35.067 <sup>401</sup>	10.18 <sup>18</sup>
17.7	18.099 <sup>293</sup>	14.39 <sup>17</sup>	26.460 <sup>317</sup>	63.12 <sup>191</sup>	53.927 <sup>269</sup>	48.89 <sup>93</sup>	35.468 <sup>374</sup>	10.00 <sup>40</sup>
27.7	18.383 <sup>265</sup>	14.22 <sup>30</sup>	26.777 <sup>290</sup>	65.03 <sup>193</sup>	54.196 <sup>245</sup>	47.96 <sup>61</sup>	35.842 <sup>340</sup>	10.40 <sup>96</sup>
Sept. 6.6	18.648 <sup>233</sup>	14.52 <sup>77</sup>	27.067 <sup>260</sup>	66.96 <sup>193</sup>	54.441 <sup>218</sup>	47.35 <sup>28</sup>	36.182 <sup>299</sup>	11.36 <sup>148</sup>
16.6	18.881 <sup>197</sup>	15.29 <sup>119</sup>	27.327 <sup>227</sup>	68.89 <sup>189</sup>	54.659 <sup>189</sup>	47.07 <sup>3</sup>	36.481 <sup>249</sup>	12.84 <sup>197</sup>
26.6	19.078 <sup>160</sup>	16.48 <sup>156</sup>	27.554 <sup>193</sup>	70.78 <sup>183</sup>	54.848 <sup>158</sup>	47.10 <sup>34</sup>	36.730 <sup>195</sup>	14.81 <sup>234</sup>
Oct. 6.6	19.238 <sup>120</sup>	18.04 <sup>187</sup>	27.747 <sup>159</sup>	72.61 <sup>172</sup>	55.006 <sup>126</sup>	47.44 <sup>60</sup>	36.925 <sup>137</sup>	17.15 <sup>268</sup>
16.5	19.358 <sup>81</sup>	19.91 <sup>211</sup>	27.906 <sup>123</sup>	74.33 <sup>159</sup>	55.132 <sup>96</sup>	48.04 <sup>82</sup>	37.062 <sup>77</sup>	19.83 <sup>288</sup>
26.5	19.439 <sup>42</sup>	22.02 <sup>224</sup>	28.029 <sup>89</sup>	75.92 <sup>145</sup>	55.228 <sup>65</sup>	48.86 <sup>99</sup>	37.139 <sup>21</sup>	22.71 <sup>296</sup>
Nov. 5.5	19.481 <sup>5</sup>	24.26 <sup>223</sup>	28.118 <sup>52</sup>	77.37 <sup>129</sup>	55.293 <sup>34</sup>	49.85 <sup>112</sup>	37.160 <sup>38</sup>	25.67 <sup>296</sup>
15.4	19.486 <sup>31</sup>	26.54 <sup>225</sup>	28.170 <sup>18</sup>	78.66 <sup>109</sup>	55.327 <sup>6</sup>	50.97 <sup>120</sup>	37.122 <sup>91</sup>	28.63 <sup>283</sup>
25.4	19.455 <sup>64</sup>	28.79 <sup>210</sup>	28.188 <sup>18</sup>	79.75 <sup>89</sup>	55.333 <sup>23</sup>	52.17 <sup>120</sup>	37.031 <sup>139</sup>	31.45 <sup>257</sup>
Dec. 5.4	19.391 <sup>93</sup>	30.89 <sup>190</sup>	28.170 <sup>51</sup>	80.64 <sup>64</sup>	55.310 <sup>48</sup>	53.37 <sup>116</sup>	36.892 <sup>185</sup>	34.02 <sup>224</sup>
15.4	19.298 <sup>121</sup>	32.79 <sup>161</sup>	28.119 <sup>83</sup>	81.28 <sup>41</sup>	55.262 <sup>74</sup>	54.53 <sup>109</sup>	36.707 <sup>223</sup>	36.26 <sup>181</sup>
25.3	19.177 <sup>144</sup>	34.40 <sup>128</sup>	28.036 <sup>114</sup>	81.69 <sup>14</sup>	55.188 <sup>96</sup>	55.62 <sup>98</sup>	36.484 <sup>253</sup>	38.07 <sup>135</sup>
35.3	19.033	35.68	27.922	81.83	55.092	56.60	36.231	39.42
Mean Place	14.907	47.04	22.490	50.23	50.533	75.03	32.555	45.88
Sec $\delta$ , Tan $\delta$	1.168	-0.604	1.199	+0.661	1.007	-0.119	1.620	-1.275
$D\psi\alpha$ , $D\omega\alpha$	+0.05	+0.03	+0.07	-0.04	+0.06	+0.01	+0.04	+0.07
$D\psi\delta$ , $D\omega\delta$	+0.3	+0.5	+0.3	+0.5	+0.3	+0.5	+0.3	+0.6

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Ceti. (Mira.) Var. 1.7-9.6			♋ Fornacis. Mag. 5.4			♊ Hydr. Mag. 4.3			♑ Cassiopeie. Mag. 4.6		
	Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.	
	h m	° '		h m	° '		h m	° '		h m	° '	
	2 15	- 3 20		2 18	-24 11		2 20	-69 1		2 22	+67 1	
	s	"		s	"		s	"		s	"	
Jan. 0.3	10.717	69.37	83	46.250	37.21	108	18.41	83.20	89	15.31	71.72	107
10.3	10.616	70.20	83	46.119	38.29	76	17.86	84.09	28	14.94	72.79	55
20.3	10.496	70.91	71	45.971	39.05	41	17.29	84.37	31	14.53	73.34	1
30.2	10.366	71.49	58	45.811	39.46	5	16.70	84.06	81	14.09	73.33	54
Feb. 9.2	10.229	71.90	41	45.646	39.51	80	16.12	83.15	91	13.64	72.79	107
19.2	10.093	72.14	7	45.484	39.21	67	15.56	81.69	197	13.20	71.72	154
Mar. 1.2	9.966	72.21	15	45.331	38.54	100	15.04	79.72	243	12.79	70.18	194
11.1	9.856	72.06	35	45.197	37.54	133	14.58	77.29	281	12.44	68.24	225
21.1	9.772	71.71	57	45.088	36.21	164	14.17	74.48	316	12.17	65.99	248
31.1	9.719	71.14	81	45.013	34.57	191	13.85	71.32	340	11.97	63.51	261
Apr. 10.0	9.703	70.33	102	44.977	32.66	216	13.61	67.92	360	11.88	60.90	261
20.0	9.729	69.31	126	44.984	30.50	237	13.47	64.32	369	11.89	58.29	253
30.0	9.800	68.05	146	45.037	28.13	253	13.44	60.63	371	12.02	55.76	235
May 10.0	9.915	66.59	165	45.138	25.60	263	13.51	56.92	365	12.25	53.41	209
19.9	10.073	64.94	178	45.285	22.97	269	13.68	53.27	350	12.59	51.32	175
29.9	10.272	63.16	191	45.475	20.28	267	13.95	49.77	328	13.02	49.57	138
June 8.9	10.505	61.25	198	45.704	17.61	259	14.31	46.49	297	13.53	48.19	94
18.9	10.769	59.27	199	45.968	15.02	246	14.75	43.52	268	14.11	47.25	49
28.8	11.054	57.28	196	46.257	12.56	224	15.28	40.94	214	14.74	46.76	2
July 8.8	11.356	55.33	187	46.566	10.32	197	15.85	38.80	163	15.41	46.74	44
18.8	11.664	53.46	172	46.885	8.35	165	16.47	37.17	107	16.09	47.18	89
28.7	11.973	51.74	152	47.206	6.70	128	17.10	36.10	47	16.78	48.07	131
Aug. 7.7	12.274	50.22	129	47.522	5.42	86	17.75	35.63	13	17.46	49.38	171
17.7	12.563	48.93	103	47.826	4.56	44	18.38	35.76	71	18.12	51.09	207
27.7	12.833	47.90	73	48.111	4.12	1	18.97	36.47	132	18.74	53.16	237
Sept. 6.6	13.079	47.17	45	48.372	4.13	45	19.52	37.79	185	19.31	55.53	265
16.6	13.300	46.72	13	48.604	4.58	86	19.99	39.64	234	19.83	58.18	284
26.6	13.490	46.59	15	48.804	5.44	122	20.38	41.98	274	20.29	61.02	302
Oct. 6.6	13.651	46.74	40	48.969	6.66	155	20.68	44.72	303	20.68	64.04	310
16.5	13.782	47.14	63	49.099	8.21	177	20.88	47.75	321	21.00	67.14	313
26.5	13.880	47.77	81	49.193	9.98	196	20.97	50.96	327	21.24	70.27	308
Nov. 5.5	13.948	48.58	93	49.252	11.93	203	20.94	54.23	320	21.39	73.35	300
15.4	13.988	49.51	102	49.276	13.96	202	20.82	57.43	301	21.47	76.35	282
25.4	13.997	50.53	105	49.267	15.98	194	20.59	60.44	270	21.46	79.17	254
Dec. 5.4	13.979	51.58	106	49.227	17.92	180	20.27	63.14	230	21.36	81.71	222
15.4	13.935	52.63	100	49.156	19.72	156	19.87	65.44	182	21.18	83.93	183
25.3	13.865	53.63	91	49.059	21.28	128	19.39	67.26	127	20.92	85.76	136
35.3	13.772	54.54	83	48.937	22.56	108	18.87	68.53	92	20.58	87.12	92
Mean Place	9.150	73.83		44.646	35.30		14.017	72.48		12.509	48.50	
Sec $\delta$ , Tan $\delta$	1.002	-0.058		1.096	-0.449		2.795	-2.610		2.563	+2.360	
$D_{\alpha} \alpha$ , $D_{\alpha} \alpha$	+0.06	0.00		+0.05	+0.02		+0.02	+0.14		+0.10	-0.13	
$D_{\delta} \delta$ , $D_{\delta} \delta$	+0.3	+0.6		+0.3	+0.6		+0.3	+0.6		+0.3	+0.8	

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\xi^2$ Ceti. Mag. 4.3			$\sigma$ Ceti. Mag. 4.8			36 H. Cassiopeiæ. Mag. 5.3			$\nu$ Ceti. Mag. 5.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 2 23	s + 8 5	" "	h m 2 28	s -15 36	" "	h m 2 30	s +72 27	" "	h m 2 31	s + 5 13	" "
Jan. 0.3	46.258	27.28		10.749	28.80		10.16	46.29		32.640	61.40	
10.3	46.163	26.66	62	10.636	29.86	106	9.70	47.62	133	32.547	60.75	65
20.3	46.047	26.05	61	10.506	30.67	81	9.13	48.40	78	32.433	60.10	65
30.2	45.917	25.45	60	10.362	31.22	55	8.53	48.60	20	32.304	59.50	60
Feb. 9.2	45.779	24.88	57	10.210	31.48	26	7.92	48.22	38	32.166	58.97	53
	138	51		153	2		60	94		141	45	
19.2	45.641	24.37	43	10.057	31.46		7.32	47.28		32.025	58.52	35
Mar. 1.2	45.510	23.94	34	9.912	31.14	32	6.76	45.83	145	31.891	58.17	20
11.1	45.396	23.60	19	9.783	30.52	62	6.26	43.92	191	31.773	57.97	7
21.1	45.306	23.41	4	9.678	29.63	89	5.86	41.64	228	31.677	57.90	11
31.1	45.249	23.37	15	9.604	28.45	118	5.57	39.08	256	31.612	58.01	30
	19			37	144		15	271		27		
Apr. 10.1	45.230	23.52	35	9.567	27.01		5.42	36.37		31.585	58.31	
20.0	45.253	23.87	56	9.572	25.32	169	5.40	33.60	277	31.600	58.81	50
30.0	45.322	24.43	56	9.621	23.41	191	5.52	30.88	272	31.659	59.53	72
May 10.0	45.437	25.22	79	9.715	21.32	209	5.77	28.31	257	31.764	60.46	93
19.9	45.596	26.21	90	9.855	19.07	225	6.17	25.97	234	31.913	61.61	115
	200	121		183	234		51	202		190	132	
29.9	45.796	27.42		10.038	16.73		6.68	23.95		32.103	62.93	
June 8.9	46.032	28.80	138	10.258	14.35	238	7.30	22.31	164	32.330	64.41	148
18.9	46.299	30.33	153	10.511	11.98	237	8.01	21.09	122	32.589	66.04	163
28.8	46.588	31.97	164	10.789	9.68	230	8.79	20.33	76	32.872	67.75	171
July 8.8	46.894	33.67	170	11.085	7.52	216	9.62	20.04	29	33.172	69.48	173
	313	171		309	197		86	19		310	173	
18.8	47.207	35.38		11.394	5.55		10.48	20.23		33.482	71.21	
28.8	47.522	37.07	169	11.705	3.83	172	11.35	20.89	66	33.794	72.88	167
Aug. 7.7	47.829	38.66	159	12.011	2.41	142	12.21	22.01	112	34.100	74.45	157
17.7	48.125	40.13	147	12.308	1.34	107	13.05	23.57	156	34.396	75.87	142
27.7	48.403	41.45	132	12.586	0.63	71	13.85	25.51	194	34.676	77.09	122
	256	112		257	32		73	229		258	102	
Sept. 6.6	48.659	42.57		12.843	0.31		14.58	27.80		34.934	78.11	
16.6	48.890	43.48	91	13.075	0.39	8	15.26	30.41	261	35.168	78.88	77
26.6	49.092	44.16	68	13.277	0.83	44	15.87	33.27	286	35.375	79.42	54
Oct. 6.6	49.266	44.63	47	13.448	1.63	80	16.39	36.33	306	35.555	79.71	29
16.5	49.411	44.88	25	13.588	2.73	110	16.81	39.52	319	35.704	79.78	7
	114	5		106	133		31	327		120	14	
26.5	49.525	44.93		13.694	4.06		17.12	42.79		35.824	79.64	
Nov. 5.5	49.609	44.81	12	13.767	5.59	153	17.34	46.06	327	35.915	79.32	32
15.5	49.665	44.53	28	13.810	7.24	165	17.44	49.26	320	35.975	80	46
25.4	49.690	44.14	39	13.820	8.92	168	17.43	52.30	304	36.005	80	58
Dec. 5.4	49.687	43.66	48	13.800	10.57	165	17.30	55.11	281	36.007	77.63	65
	33	55		49	156		25	248		28	71	
15.4	49.654	43.11		13.751	12.13		17.05	57.59		35.979	76.92	
25.3	49.595	42.51	60	13.674	13.55	142	16.71	59.68	209	35.924	76.20	72
35.3	49.511	41.88	63	13.573	14.77	122	16.27	61.31	163	35.843	75.50	70
Mean Place	44.617	19.19		9.116	29.45		6.628	22.70		30.967	54.36	
Sec $\delta$ , Tan $\delta$	1.010	+0.142		1.038	-0.279		3.318	+3.164		1.004	+0.092	
$D\psi a$ , $D\omega a$	+0.06	-0.01		+0.06	+0.01		+0.11	-0.17		+0.06	-0.01	
$D\psi \delta$ , $D\omega \delta$	+0.3	+0.6		+0.3	+0.6		+0.3	+0.6		+0.3	+0.6	

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Hydri. Mag. 5.3			$\nu$ Arietis. Mag. 5.4			$\delta$ Ceti. Mag. 4.0			$\epsilon$ Hydri. Mag. 4.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	2	33	-79 27	2	34	+21 36	2	35	- 0 1	2	38	-68 36
	s		"	s		"	s		"	s		"
Jan. 0.3	27.66		89.07 59	7.785		23.37 25	15.287		38.35 81	21.00		90.86 116
10.3	26.49	117	89.96 29	7.686	99	23.12 25	15.193	94	39.16 81	20.48	52	92.02 56
20.3	25.24	125	90.25 29	7.564	122	22.74 38	15.078	115	39.87 71	19.92	56	92.58 56
30.2	23.98	126	89.93 32	7.425	139	22.23 51	14.948	130	40.48 61	19.33	59	92.54 4
Feb. 9.2	22.74	124	89.02 91	7.275	150	21.61 62	14.808	140	40.97 49	18.75	58	91.92 62
		121	147		153	72		142			57	119
19.2	21.53		87.55 199	7.122		20.89 78	14.666		41.32 18	18.18		90.73 172
Mar. 1.2	20.40	113	85.56 243	6.976	146	20.11 81	14.529	137	41.50 2	17.64	54	89.01 220
11.1	19.36	104	83.13 282	6.848	128	19.30 78	14.407	122	41.52 17	17.14	50	88.81 263
21.1	18.44	92	80.31 317	6.744	104	18.52 71	14.307	100	41.35 37	16.70	44	84.18 298
31.1	17.69	75	77.14 340	6.675	69	17.81 61	14.238	90	40.98 58	16.34	36	81.20 327
Apr. 10.1	17.09	43	73.74 358	6.647	17	17.20 46	14.205	9	40.40 81	16.06	18	77.93 349
20.0	16.66	22	70.16 368	6.664	65	16.74 26	14.214	53	39.59 102	15.88	8	74.44 363
30.0	16.44	3	66.48 369	6.729	115	16.48 6	14.267	98	38.57 124	15.80	2	70.81 368
May 10.0	16.41	16	62.79 363	6.844	163	16.42 19	14.365	143	37.33 142	15.82	11	67.13 367
19.9	16.57	36	59.16 347	7.007	207	16.61 43	14.508	183	35.91 190	15.93	23	63.46 355
29.9	16.93		55.69 325	7.214		17.04 67	14.691		34.31 172	16.16		59.91 338
June 8.9	17.46	53	52.44 294	7.460	246	17.71 89	14.912	221	32.59 182	16.48	32	56.53 308
18.9	18.17	71	49.50 255	7.738	278	18.60 111	15.165	253	30.77 187	16.88	40	53.45 274
28.8	19.03	86	46.95 210	8.042	304	19.71 127	15.442	277	28.90 186	17.36	48	50.71 232
July 8.8	20.01	98	44.85 159	8.365	331	20.98 141	15.737	295	27.04 181	17.90	54	48.39 182
18.8	21.08		43.26 104	8.696		22.39 151	16.043		25.23 169	18.48		46.57 129
28.8	22.22	114	42.22 43	9.029	333	23.90 156	16.352	309	23.54 154	19.10	62	45.28 71
Aug. 7.7	23.39	117	41.79 16	9.358	329	25.46 157	16.655	303	22.00 134	19.73	63	44.57 10
17.7	24.55	116	41.95 77	9.675	317	27.03 154	16.950	295	20.66 110	20.36	63	44.47 53
27.7	25.67	103	42.72 136	9.974	278	28.57 148	17.229	279	19.56 85	20.96	60	45.00 112
Sept. 6.6	26.70		44.08 191	10.252		30.05 139	17.486		18.71 56	21.52		46.12 169
16.6	27.61	91	45.99 238	10.505	253	31.44 126	17.721	235	18.15 27	22.02	50	47.81 219
26.6	28.37	76	48.37 278	10.732	227	32.70 114	17.928	207	17.88 1	22.44	42	50.00 264
Oct. 6.6	28.96	59	51.15 309	10.928	196	33.84 99	18.109	181	17.87 24	22.78	34	52.64 296
16.5	29.34	38	54.24 325	11.095	167	34.83 83	18.259	150	18.11 46	23.01	23	55.60 319
26.5	29.51		57.49 331	11.232	104	35.66 68	18.379	92	18.57 65	23.15	3	58.79 331
Nov. 5.5	29.45	6	60.80 325	11.336	74	36.34 54	18.471	61	19.22 78	23.18	7	62.10 328
15.5	29.17	28	64.05 305	11.410	40	36.88 40	18.532	31	20.00 88	23.11	18	65.38 313
25.4	28.68	49	67.10 274	11.450	10	37.28 25	18.563	2	20.88 95	22.83	29	68.51 288
Dec. 5.4	28.00	86	69.84 233	11.460	23	37.53 11	18.565	28	21.82 95	22.64	36	71.39 250
15.4	27.14		72.17 183	11.437		37.64 3	18.537		22.77 92	22.28		73.89 205
25.3	26.12	102	74.00 129	11.382	55	37.61 19	18.482	55	23.69 87	21.85	43	75.94 152
35.3	25.01	111	75.29	11.298	84	37.42	18.400	82	24.56	21.35	50	77.46
Mean Place	23.719		78.11	6.008		11.29	13.607		43.75	18.462		80.74
Sec $\delta$ , Tan $\delta$	5.470		-5.379	1.076		+0.396	1.000		0.000	2.744		-2.555
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	-0.03		+0.28	+0.07		-0.02	+0.06		0.00	+0.02		+0.13
D $\psi$ $\delta$ , D $\omega$ $\delta$	+0.3		+0.6	+0.3		+0.6	+0.3		+0.6	+0.3		+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Persei. Mag. 4.2		$\gamma$ Ceti seq. Mag. 3.7		$\pi$ Ceti. Mag. 4.4		$\mu$ Ceti. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 38	° ' " +48 52	h m 2 38	° ' " + 2 53	h m 2 40	° ' " -14 12	h m 2 40	° ' " + 9 45
	s	"	s	"	s	"	s	"
Jan. 0.3	33.574	60.90	61.581	18.20	11.960	33.41	28.894	60.45
10.3	33.410 <sup>164</sup>	61.56 <sup>66</sup>	61.490 <sup>91</sup>	17.46 <sup>74</sup>	11.855 <sup>105</sup>	34.51 <sup>110</sup>	28.806 <sup>88</sup>	59.88 <sup>57</sup>
20.3	33.213 <sup>197</sup>	61.82 <sup>26</sup>	61.377 <sup>113</sup>	16.78 <sup>68</sup>	11.727 <sup>128</sup>	35.38 <sup>87</sup>	28.694 <sup>112</sup>	59.30 <sup>58</sup>
30.3	32.989 <sup>224</sup>	61.69 <sup>13</sup>	61.247 <sup>130</sup>	16.17 <sup>61</sup>	11.584 <sup>143</sup>	35.99 <sup>61</sup>	28.565 <sup>129</sup>	58.72 <sup>58</sup>
Feb. 9.2	32.752 <sup>237</sup>	61.16 <sup>53</sup>	61.108 <sup>139</sup>	15.65 <sup>52</sup>	11.432 <sup>152</sup>	36.33 <sup>34</sup>	28.424 <sup>141</sup>	58.16 <sup>56</sup>
	239	90	143	42	155	7	144	52
19.2	32.513	60.26	60.965	15.23	11.277	36.40	28.280	57.64
Mar. 1.2	32.285 <sup>228</sup>	59.02 <sup>124</sup>	60.827 <sup>138</sup>	14.97 <sup>26</sup>	11.127 <sup>150</sup>	36.17 <sup>23</sup>	28.141 <sup>139</sup>	57.17 <sup>47</sup>
11.1	32.083 <sup>202</sup>	57.50 <sup>152</sup>	60.703 <sup>124</sup>	14.83 <sup>14</sup>	10.990 <sup>137</sup>	35.67 <sup>50</sup>	28.017 <sup>124</sup>	56.79 <sup>38</sup>
21.1	31.920 <sup>163</sup>	55.77 <sup>173</sup>	60.601 <sup>102</sup>	14.86 <sup>3</sup>	10.877 <sup>113</sup>	34.87 <sup>80</sup>	27.914 <sup>103</sup>	56.53 <sup>26</sup>
31.1	31.805 <sup>115</sup>	53.90 <sup>187</sup>	60.529 <sup>72</sup>	15.08 <sup>22</sup>	10.794 <sup>83</sup>	33.80 <sup>107</sup>	27.843 <sup>71</sup>	56.40 <sup>13</sup>
	57	192	35	41	48	133	34	3
Apr. 10.1	31.748	51.98	60.494	15.49	10.746	32.47	27.809	56.43
20.0	31.758 <sup>10</sup>	50.09 <sup>189</sup>	60.500 <sup>6</sup>	16.12 <sup>63</sup>	10.740 <sup>6</sup>	30.89 <sup>158</sup>	27.817 <sup>8</sup>	56.66 <sup>23</sup>
30.0	31.833 <sup>75</sup>	48.31 <sup>178</sup>	60.550 <sup>50</sup>	16.96 <sup>84</sup>	10.778 <sup>38</sup>	29.09 <sup>180</sup>	27.871 <sup>54</sup>	57.09 <sup>43</sup>
May 10.0	31.977 <sup>144</sup>	46.71 <sup>160</sup>	60.646 <sup>96</sup>	18.01 <sup>105</sup>	10.862 <sup>84</sup>	27.09 <sup>200</sup>	27.972 <sup>101</sup>	57.74 <sup>65</sup>
20.0	32.186 <sup>209</sup>	45.35 <sup>136</sup>	60.786 <sup>140</sup>	19.25 <sup>124</sup>	10.992 <sup>130</sup>	24.92 <sup>217</sup>	28.118 <sup>146</sup>	58.59 <sup>85</sup>
	269	106	183	143	172	226	187	106
29.9	32.455	44.29	60.969	20.68	11.164	22.66	28.305	59.64
June 8.9	32.777 <sup>322</sup>	43.56 <sup>73</sup>	61.189 <sup>220</sup>	22.25 <sup>157</sup>	11.375 <sup>211</sup>	20.33 <sup>233</sup>	28.531 <sup>226</sup>	60.89 <sup>125</sup>
18.9	33.145 <sup>368</sup>	43.18 <sup>38</sup>	61.441 <sup>252</sup>	23.95 <sup>170</sup>	11.620 <sup>245</sup>	18.00 <sup>233</sup>	28.789 <sup>258</sup>	62.28 <sup>139</sup>
28.8	33.547 <sup>402</sup>	43.16 <sup>2</sup>	61.718 <sup>277</sup>	25.70 <sup>175</sup>	11.891 <sup>271</sup>	15.72 <sup>228</sup>	29.072 <sup>283</sup>	63.79 <sup>151</sup>
July 8.8	33.973 <sup>426</sup>	43.50 <sup>34</sup>	62.013 <sup>295</sup>	27.48 <sup>178</sup>	12.182 <sup>291</sup>	13.56 <sup>216</sup>	29.375 <sup>303</sup>	65.38 <sup>159</sup>
	440	70	307	174	305	198	312	162
18.8	34.413	44.20	62.320	29.22	12.487	11.58	29.687	67.00
28.8	34.859 <sup>446</sup>	45.23 <sup>103</sup>	62.629 <sup>309</sup>	30.89 <sup>167</sup>	12.795 <sup>308</sup>	9.84 <sup>174</sup>	30.002 <sup>315</sup>	68.60 <sup>160</sup>
Aug. 7.7	35.300 <sup>441</sup>	46.55 <sup>132</sup>	62.934 <sup>305</sup>	32.43 <sup>154</sup>	13.101 <sup>306</sup>	8.37 <sup>147</sup>	30.314 <sup>312</sup>	70.15 <sup>155</sup>
17.7	35.728 <sup>428</sup>	48.14 <sup>159</sup>	63.230 <sup>296</sup>	33.80 <sup>137</sup>	13.399 <sup>298</sup>	7.24 <sup>113</sup>	30.615 <sup>301</sup>	71.59 <sup>144</sup>
27.7	36.134 <sup>406</sup>	49.95 <sup>181</sup>	63.511 <sup>281</sup>	34.95 <sup>115</sup>	13.682 <sup>283</sup>	6.47 <sup>77</sup>	30.902 <sup>287</sup>	72.89 <sup>130</sup>
	381	200	260	93	262	39	267	112
Sept. 6.7	36.515	51.95	63.771	35.88	13.944	6.08	31.169	74.01
16.6	36.864 <sup>349</sup>	54.10 <sup>215</sup>	64.009 <sup>238</sup>	36.55 <sup>67</sup>	14.183 <sup>239</sup>	6.07 <sup>1</sup>	31.413 <sup>244</sup>	74.94 <sup>93</sup>
26.6	37.177 <sup>313</sup>	56.35 <sup>225</sup>	64.220 <sup>211</sup>	36.95 <sup>40</sup>	14.394 <sup>211</sup>	6.44 <sup>37</sup>	31.631 <sup>218</sup>	75.65 <sup>71</sup>
Oct. 6.6	37.453 <sup>276</sup>	58.66 <sup>231</sup>	64.405 <sup>185</sup>	37.10 <sup>15</sup>	14.576 <sup>182</sup>	7.16 <sup>72</sup>	31.822 <sup>191</sup>	76.16 <sup>51</sup>
16.5	37.687 <sup>234</sup>	60.99 <sup>233</sup>	64.560 <sup>155</sup>	37.02 <sup>8</sup>	14.727 <sup>151</sup>	8.18 <sup>102</sup>	31.984 <sup>162</sup>	76.45 <sup>29</sup>
	190	231	125	32	119	129	133	11
26.5	37.877	63.30	64.685	36.70	14.846	9.47	32.117	76.56
Nov. 5.5	38.021 <sup>144</sup>	65.54 <sup>224</sup>	64.782 <sup>97</sup>	36.22 <sup>48</sup>	14.934 <sup>88</sup>	10.94 <sup>147</sup>	32.220 <sup>103</sup>	76.50 <sup>6</sup>
15.5	38.118 <sup>97</sup>	67.66 <sup>212</sup>	64.848 <sup>66</sup>	35.60 <sup>62</sup>	14.989 <sup>55</sup>	12.54 <sup>160</sup>	32.293 <sup>73</sup>	76.30 <sup>20</sup>
25.4	38.167 <sup>49</sup>	69.63 <sup>197</sup>	64.884 <sup>36</sup>	34.86 <sup>74</sup>	15.012 <sup>23</sup>	14.20 <sup>166</sup>	32.336 <sup>43</sup>	75.98 <sup>32</sup>
Dec. 5.4	38.165 <sup>2</sup>	71.40 <sup>177</sup>	64.891 <sup>7</sup>	34.07 <sup>79</sup>	15.005 <sup>7</sup>	15.83 <sup>163</sup>	32.348 <sup>12</sup>	75.56 <sup>42</sup>
	50	151	24	83	38	157	18	49
15.4	38.115	72.91	64.867	33.24	14.967	17.40	32.330	75.07
25.4	38.017 <sup>98</sup>	74.11 <sup>120</sup>	64.815 <sup>52</sup>	32.41 <sup>83</sup>	14.900 <sup>67</sup>	18.84 <sup>144</sup>	32.283 <sup>47</sup>	74.53 <sup>54</sup>
35.3	37.875 <sup>142</sup>	74.97 <sup>86</sup>	64.736 <sup>79</sup>	31.61 <sup>80</sup>	14.806 <sup>94</sup>	20.09 <sup>125</sup>	32.206 <sup>77</sup>	73.96 <sup>57</sup>
Mean Place	31.361	41.76	59.876	11.96	10.269	34.51	27.153	52.09
Sec $\delta$ , Tan $\delta$	1.520	+1.146	1.001	+0.050	1.031	-0.253	1.015	+0.172
$D\psi\alpha$ , $D_\alpha\alpha$	+0.08	-0.06	+0.06	0.00	+0.06	+0.01	+0.06	-0.01
$D\psi\delta$ , $D_\alpha\delta$	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6	+0.3	+0.6

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\eta$ Persei. Mag. 3.9		$\epsilon$ Arietis. Mag. 3.7		$\beta$ Fornacis. Mag. 4.5		$\sigma$ Arietis. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 44	° ' " +55 33	h m 2 45	° ' " +26 55	h m 2 45	° ' " -32 44	h m 2 46	° ' " +14 44
	s	"	s	"	s	"	s	"
Jan. 0.3	40.440	27.33	7.526	22.46	38.788	78.37	56.230	36.03
10.3	40.242 <sup>198</sup>	28.27 <sup>94</sup>	7.428 <sup>98</sup>	22.43 <sup>3</sup>	38.640 <sup>148</sup>	79.75 <sup>138</sup>	56.144 <sup>86</sup>	35.61 <sup>42</sup>
20.3	40.001 <sup>241</sup>	28.76 <sup>49</sup>	7.303 <sup>125</sup>	22.20 <sup>23</sup>	38.469 <sup>171</sup>	80.72 <sup>97</sup>	56.032 <sup>112</sup>	35.13 <sup>48</sup>
30.3	39.729 <sup>272</sup>	28.81 <sup>5</sup>	7.157 <sup>146</sup>	21.79 <sup>41</sup>	38.282 <sup>187</sup>	81.27 <sup>55</sup>	55.901 <sup>131</sup>	34.60 <sup>53</sup>
Feb. 9.2	39.440 <sup>289</sup>	28.41 <sup>40</sup>	6.997 <sup>160</sup>	21.22 <sup>57</sup>	38.085 <sup>197</sup>	81.38 <sup>11</sup>	55.757 <sup>144</sup>	34.04 <sup>56</sup>
	291	83	164	73	199	31	149	58
19.2	39.149	27.58	6.833	20.49	37.886	81.07	55.608	33.46
Mar. 1.2	38.870 <sup>279</sup>	26.33 <sup>125</sup>	6.675 <sup>158</sup>	19.64 <sup>85</sup>	37.693 <sup>193</sup>	80.33 <sup>74</sup>	55.464 <sup>144</sup>	32.89 <sup>57</sup>
11.1	38.621 <sup>249</sup>	24.75 <sup>158</sup>	6.532 <sup>143</sup>	18.71 <sup>93</sup>	37.516 <sup>177</sup>	79.19 <sup>114</sup>	55.333 <sup>131</sup>	32.35 <sup>54</sup>
21.1	38.415 <sup>206</sup>	22.91 <sup>184</sup>	6.415 <sup>117</sup>	17.75 <sup>96</sup>	37.365 <sup>151</sup>	77.66 <sup>153</sup>	55.225 <sup>108</sup>	31.88 <sup>47</sup>
31.1	38.265 <sup>150</sup>	20.86 <sup>206</sup>	6.333 <sup>82</sup>	16.80 <sup>95</sup>	37.246 <sup>119</sup>	75.79 <sup>187</sup>	55.147 <sup>78</sup>	31.51 <sup>37</sup>
	82	216	41	88	80	219	40	23
Apr. 10.1	38.183	18.70	6.292 <sup>—</sup>	15.92 <sup>76</sup>	37.166 <sup>33</sup>	73.60 <sup>245</sup>	55.107 <sup>50</sup>	31.28 <sup>7</sup>
20.0	38.174 <sup>9</sup>	16.53 <sup>217</sup>	6.299 <sup>—</sup>	15.16 <sup>60</sup>	37.133 <sup>14</sup>	71.15 <sup>268</sup>	55.110 <sup>3</sup>	31.21 <sup>11</sup>
30.0	38.242 <sup>68</sup>	14.45 <sup>208</sup>	6.356 <sup>57</sup>	14.56 <sup>40</sup>	37.147 <sup>64</sup>	68.47 <sup>285</sup>	55.160 <sup>97</sup>	31.32 <sup>33</sup>
May 10.0	38.390 <sup>148</sup>	12.50 <sup>195</sup>	6.464 <sup>108</sup>	14.16 <sup>16</sup>	37.211 <sup>115</sup>	65.62 <sup>295</sup>	55.257 <sup>143</sup>	31.65 <sup>54</sup>
20.0	38.611 <sup>221</sup>	10.80 <sup>170</sup>	6.623 <sup>159</sup>	14.00 <sup>7</sup>	37.326 <sup>164</sup>	62.67 <sup>299</sup>	55.400 <sup>186</sup>	32.19 <sup>76</sup>
	293	144	205					
29.9	38.904	9.36	6.828	14.07	37.490	59.68	55.586	32.95
June 8.9	39.257 <sup>353</sup>	8.27 <sup>109</sup>	7.074 <sup>246</sup>	14.41 <sup>34</sup>	37.698 <sup>206</sup>	56.71 <sup>297</sup>	55.812 <sup>226</sup>	33.91 <sup>96</sup>
18.9	39.664 <sup>407</sup>	7.55 <sup>72</sup>	7.356 <sup>282</sup>	14.98 <sup>57</sup>	37.945 <sup>247</sup>	53.85 <sup>286</sup>	56.071 <sup>259</sup>	35.05 <sup>114</sup>
28.8	40.112 <sup>448</sup>	7.21 <sup>34</sup>	7.666 <sup>310</sup>	15.80 <sup>82</sup>	38.225 <sup>280</sup>	51.17 <sup>268</sup>	56.356 <sup>285</sup>	36.34 <sup>129</sup>
July 8.8	40.591 <sup>479</sup>	7.26 <sup>5</sup>	7.995 <sup>329</sup>	16.82 <sup>102</sup>	38.531 <sup>306</sup>	48.72 <sup>245</sup>	56.662 <sup>306</sup>	37.75 <sup>141</sup>
	498	43	341	121	322	212	316	148
18.8	41.089	7.69	8.336	18.03	38.853	46.60	56.978	39.23
28.8	41.594 <sup>505</sup>	8.51 <sup>82</sup>	8.682 <sup>346</sup>	19.38 <sup>135</sup>	39.185 <sup>332</sup>	44.85 <sup>175</sup>	57.299 <sup>321</sup>	40.75 <sup>152</sup>
Aug. 7.7	42.096 <sup>502</sup>	9.68 <sup>117</sup>	9.024 <sup>342</sup>	20.83 <sup>145</sup>	39.518 <sup>333</sup>	43.54 <sup>131</sup>	57.617 <sup>318</sup>	42.26 <sup>151</sup>
17.7	42.584 <sup>488</sup>	11.16 <sup>148</sup>	9.356 <sup>332</sup>	22.35 <sup>152</sup>	39.844 <sup>326</sup>	42.69 <sup>85</sup>	57.926 <sup>309</sup>	43.71 <sup>145</sup>
27.7	43.051 <sup>467</sup>	12.93 <sup>177</sup>	9.672 <sup>316</sup>	23.90 <sup>154</sup>	40.154 <sup>310</sup>	42.33 <sup>36</sup>	58.221 <sup>295</sup>	45.08 <sup>137</sup>
	439	203	296	154	291	16	275	123
Sept. 6.7	43.490	14.96	9.968	25.44	40.445	42.49	58.496	46.31
16.6	43.894 <sup>404</sup>	17.18 <sup>222</sup>	10.240 <sup>272</sup>	26.94 <sup>150</sup>	40.708 <sup>263</sup>	43.14 <sup>65</sup>	58.749 <sup>253</sup>	47.40 <sup>108</sup>
26.6	44.258 <sup>364</sup>	19.55 <sup>237</sup>	10.485 <sup>245</sup>	28.36 <sup>142</sup>	40.940 <sup>232</sup>	44.26 <sup>112</sup>	58.977 <sup>228</sup>	48.32 <sup>92</sup>
Oct. 6.6	44.579 <sup>321</sup>	22.04 <sup>249</sup>	10.701 <sup>216</sup>	29.70 <sup>134</sup>	41.138 <sup>198</sup>	45.81 <sup>155</sup>	59.177 <sup>200</sup>	49.05 <sup>73</sup>
16.5	44.854 <sup>275</sup>	24.61 <sup>257</sup>	10.887 <sup>186</sup>	30.93 <sup>123</sup>	41.299 <sup>161</sup>	47.71 <sup>190</sup>	59.349 <sup>172</sup>	49.61 <sup>56</sup>
	222	259	154	110	122	219	143	39
26.5	45.076	27.20	11.041	32.03	41.421	49.90	59.492	50.00
Nov. 5.5	45.245 <sup>189</sup>	29.73 <sup>253</sup>	11.163 <sup>122</sup>	33.01 <sup>98</sup>	41.503 <sup>82</sup>	52.28 <sup>238</sup>	59.605 <sup>113</sup>	50.22 <sup>22</sup>
15.5	45.359 <sup>114</sup>	32.19 <sup>246</sup>	11.253 <sup>90</sup>	33.86 <sup>85</sup>	41.547 <sup>44</sup>	54.76 <sup>248</sup>	59.687 <sup>82</sup>	50.31 <sup>9</sup>
25.4	45.414 <sup>55</sup>	34.51 <sup>232</sup>	11.307 <sup>54</sup>	34.55 <sup>69</sup>	41.551 <sup>4</sup>	57.24 <sup>248</sup>	59.739 <sup>52</sup>	50.27 <sup>4</sup>
Dec. 5.4	45.409 <sup>5</sup>	36.62 <sup>211</sup>	11.327 <sup>20</sup>	35.11 <sup>56</sup>	41.517 <sup>34</sup>	59.63 <sup>239</sup>	59.758 <sup>19</sup>	50.12 <sup>15</sup>
	62	185	16	40	70	220	13	25
15.4	45.347	38.47	11.311	35.51	41.447	61.83	59.745	49.87
25.4	45.227 <sup>120</sup>	40.00 <sup>153</sup>	11.261 <sup>50</sup>	35.73 <sup>22</sup>	41.343 <sup>104</sup>	63.78 <sup>195</sup>	59.701 <sup>44</sup>	49.55 <sup>32</sup>
35.3	45.054 <sup>173</sup>	41.16 <sup>116</sup>	11.178 <sup>83</sup>	35.78 <sup>5</sup>	41.210 <sup>133</sup>	65.39 <sup>161</sup>	59.627 <sup>74</sup>	49.14 <sup>41</sup>
Mean Place	37.944	7.10	5.632	9.16	37.016	74.56	54.428	26.31
Sec $\delta$ , Tan $\delta$	1.768	+1.458	1.122	+0.508	1.189	-0.643	1.034	+0.263
$D\psi \alpha$ , $D\omega \alpha$	+0.09	-0.07	+0.07	-0.03	+0.05	+0.03	+0.07	-0.01
$D\psi \delta$ , $D\omega \delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\tau^2$ Eridani. Mag. 4.8		$\tau$ Persei. Mag. 4.1		$\gamma$ Eridani. Mag. 4.0		$\epsilon$ Arietis (mean). Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 47	° ' " -21 20	h m 2 48	° ' " +52 25	h m 2 52	° ' " - 9 13	h m 2 54	° ' " +21 0
	s	"	s	"	s	"	s	"
Jan. 0.3	18.067	44.48 125	24.234	44.88 85	24.078	37.56 107	29.629	44.02 22
10.3	17.950 117	45.73 97	24.059 175	45.73 47	23.984 94	38.63 89	29.542 87	43.80 32
20.3	17.812 138	46.70 63	23.843 216	46.20 3	23.865 119	39.52 67	29.428 114	43.48 43
30.3	17.656 156	47.33 29	23.598 245	46.23 40	23.729 136	40.19 46	29.292 136	43.05 54
Feb. 9.2	17.489 167	47.62 4	23.334 264	45.83 80	23.581 148	40.65 21	29.142 150	42.51 62
19.2	17.319 170	47.58 40	23.067 267	45.03 118	23.428 150	40.86 3	28.985 154	41.89 68
Mar. 1.2	17.155 164	47.18 74	22.811 236	43.85 149	23.278 139	40.83 28	28.831 140	41.21 72
11.2	17.004 151	46.44 106	22.580 231	42.36 176	23.139 139	40.55 52	28.691 117	40.49 69
21.1	16.875 129	45.38 136	22.388 192	40.60 193	23.022 117	40.03 79	28.574 87	39.80 65
31.1	16.776 99	44.02 166	22.248 140	38.67 202	22.932 90	39.24 102	28.487 49	39.15 57
Apr. 10.1	16.713 20	42.36 192	22.169 10	36.65 203	22.878 13	38.22 128	28.438 3	38.58 43
20.0	16.693 25	40.44 215	22.159 62	34.62 196	22.865 30	36.94 149	28.435 45	38.15 26
30.0	16.718 72	38.29 234	22.221 136	32.66 180	22.895 70	35.45 171	28.480 95	37.90 7
May 10.0	16.790 118	35.95 248	22.357 205	30.86 157	22.970 121	33.74 187	28.575 142	37.83 15
20.0	16.908 163	33.47 257	22.562 271	29.29 130	23.091 164	31.87 201	28.717 186	37.98 36
29.9	17.071 204	30.90 261	22.833 331	27.99 98	23.255 203	29.86 211	28.903 229	38.34 59
June 8.9	17.275 239	28.29 255	23.164 379	27.01 63	23.458 236	27.75 214	29.132 263	38.93 81
18.9	17.514 270	25.74 247	23.543 418	26.38 25	23.694 264	25.61 212	29.395 291	39.74 100
28.9	17.784 290	23.27 229	23.961 448	26.13 12	23.958 286	23.49 205	29.686 313	40.74 116
July 8.8	18.074 307	20.98 206	24.409 466	26.25 47	24.244 299	21.44 193	29.999 325	41.90 129
18.8	18.381 313	18.92 177	24.875 473	26.72 84	24.543 305	19.51 173	30.324 331	43.19 138
28.8	18.694 313	17.15 143	25.348 471	27.56 116	24.848 304	17.78 150	30.655 329	44.57 143
Aug. 7.7	19.007 304	15.72 104	25.819 460	28.72 145	25.152 298	16.28 122	30.984 321	46.00 145
17.7	19.311 292	14.68 63	26.279 440	30.17 172	25.450 285	15.06 90	31.305 307	47.45 141
27.7	19.603 272	14.05 19	26.719 415	31.89 194	25.735 266	14.16 55	31.612 289	48.86 135
Sept. 6.7	19.875 248	13.86 25	27.134 383	33.83 213	26.001 245	13.61 20	31.901 266	50.21 126
16.6	20.123 220	14.11 67	27.517 346	35.96 225	26.246 219	13.41 15	32.167 243	51.47 114
26.6	20.343 190	14.78 105	27.863 306	38.21 236	26.465 192	13.56 47	32.410 215	52.61 101
Oct. 6.6	20.533 158	15.83 167	28.169 263	40.57 242	26.657 163	14.03 78	32.625 187	53.62 88
16.6	20.691 124	17.21 187	28.432 217	42.99 242	26.820 134	14.81 103	32.812 156	54.50 72
26.5	20.815 91	18.88 186	28.649 168	45.41 239	26.954 103	15.84 123	32.968 126	55.22 60
Nov. 5.5	20.906 56	20.74 198	28.817 116	47.80 230	27.057 71	17.07 137	33.094 96	55.82 46
15.5	20.962 22	22.72 203	28.933 63	50.10 215	27.128 41	18.44 145	33.190 61	56.28 33
25.4	20.984 11	24.75 198	28.996 8	52.25 197	27.169 8	19.89 146	33.251 28	56.61 20
Dec. 5.4	20.973 43	26.73 187	29.004 48	54.22 172	27.177 22	21.35 142	33.279 5	56.81 9
15.4	20.930 75	28.60 168	28.956 101	55.94 143	27.155 52	22.77 133	33.274 40	56.90 3
25.4	20.855 104	30.28 145	28.855 150	57.37 107	27.103 81	24.10 118	33.234 72	56.87 15
35.3	20.751	31.73	28.705	58.44	27.022	25.28	33.162	56.72
Mean Place	16.333	43.61	21.811	25.44	22.329	40.10	27.735	32.67
Sec $\delta$ , Tan $\delta$	1.074	-0.391	1.640	+1.300	1.013	-0.162	1.071	+0.384
$D\psi\alpha$ , $D\omega\alpha$	+0.05	+0.02	+0.08	-0.06	+0.06	+0.01	+0.07	-0.02
$D\psi\delta$ , $D\omega\delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	47 H. Cephei. Mag. 5.7			$\theta$ Eridani. Mag. 3.4			$\alpha$ Ceti. Mag. 2.8			$\tau^3$ Eridani. Mag. 4.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	'	h m	s	'	h m	s	'	h m	s	'
	2	54	+	2	55	-	2	57	+	2	58	-
Jan. 0.3	65.57	55.41	180	8.843	77.75	152	58.131	59.57	75	45.736	58.21	139
10.3	64.81	57.21	124	8.666	79.27	106	58.048	58.82	68	45.618	59.60	105
20.3	63.92	58.45	66	8.462	80.33	58	57.940	58.14	62	45.477	60.05	71
30.3	62.94	59.11	4	8.240	80.91	10	57.812	57.52	53	45.315	61.36	35
Feb. 9.2	61.92	59.15	55	8.006	81.01	38	57.670	56.99	43	45.141	61.71	2
19.2	60.90	58.60		7.771	80.63	86	57.522	56.56	31	44.962	61.69	
Mar. 1.2	59.92	57.47	113	7.541	79.77	131	57.376	56.25	16	44.787	61.30	39
11.2	59.04	55.81	160	7.328	78.46	172	57.240	56.09	2	44.624	60.54	76
21.1	58.28	53.70	211	7.140	76.74	210	57.126	56.07	16	44.481	59.44	110
31.1	57.70	51.23	272	6.987	74.64	242	57.040	56.23	34	44.368	58.02	142
Apr. 10.1	57.30	48.51	287	6.876	72.22	272	56.987	56.57	54	44.290	56.29	200
20.0	57.11	45.64	292	6.813	69.50	294	56.976	57.11	76	44.254	54.29	223
30.0	57.14	42.72	285	6.803	66.56	311	57.010	57.87	94	44.264	52.06	243
May 10.0	57.40	39.87	267	6.848	63.45	320	57.089	58.81	116	44.321	49.63	258
20.0	57.86	37.20	243	6.947	60.25	322	57.213	59.97	133	44.426	47.05	265
29.9	58.53	34.77	211	7.099	57.03	317	57.380	61.30	147	44.576	44.40	269
June 8.9	59.37	32.66	172	7.301	53.86	303	57.586	62.77	160	44.769	41.71	264
18.9	60.36	30.94	128	7.548	50.83	284	57.825	64.37	168	44.999	39.07	253
28.9	61.48	29.66	82	7.832	47.99	254	58.093	66.05	170	45.261	36.54	237
July 8.8	62.71	28.84	33	8.147	45.45	218	58.381	67.75	168	45.547	34.17	212
18.8	64.01	28.51	15	8.484	43.27	177	58.683	69.43	161	45.851	32.05	182
28.8	65.34	28.66	64	8.835	41.50	129	58.990	71.04	150	46.164	30.23	145
Aug. 7.7	66.69	29.30	110	9.191	40.21	79	59.297	72.54	134	46.480	28.78	105
17.7	68.02	30.40	155	9.540	39.42	24	59.596	73.88	114	46.790	27.73	62
27.7	69.31	31.95	195	9.878	39.18	31	59.884	75.02	91	47.087	27.11	16
Sept. 6.7	70.53	33.90	232	10.194	39.49	65	60.155	75.93	66	47.368	26.95	30
16.6	71.67	36.22	266	10.484	40.34	136	60.405	76.59	41	47.625	27.25	74
26.6	72.71	38.88	202	10.740	41.70	182	60.632	77.00	16	47.857	27.99	114
Oct. 6.6	73.63	41.80	315	10.958	43.52	220	60.832	77.16	8	48.058	29.13	151
16.6	74.40	44.95	330	11.136	45.72	251	61.005	77.08	30	48.227	30.64	179
26.5	75.00	48.25	338	11.270	48.23	270	61.151	76.78	47	48.363	32.43	200
Nov. 5.5	75.44	51.63	337	11.360	50.93	280	61.267	76.31	62	48.464	34.43	215
15.5	75.69	55.00	330	11.403	53.73	280	61.354	75.69	73	48.529	36.58	219
25.4	75.75	58.30	313	11.403	56.53	268	61.409	74.96	79	48.559	38.77	214
Dec. 5.4	75.62	61.43	287	11.358	59.21	246	61.433	74.17	82	48.554	40.91	203
15.4	75.29	64.30	251	11.271	61.67	215	61.427	73.35	82	48.515	42.94	184
25.4	74.78	66.81	208	11.146	63.82	160	61.388	72.53	80	48.442	44.78	157
35.3	74.10	68.89		10.985	65.62		61.319	71.73		48.340	46.35	
Mean Place	59.610	32.52		6.964	72.34		56.323	53.30		43.945	56.75	
Sec $\delta$ , Tan $\delta$	5.285	+5.190		1.317	-0.858		1.002	+0.066		1.094	-0.444	
$D_\delta \alpha$ , $D_\alpha \alpha$	+0.16	-0.25		+0.05	+0.04		+0.06	0.00		+0.05	+0.02	
$D_\delta \delta$ , $D_\alpha \delta$	+0.3	+0.7		+0.3	+0.7		+0.3	+0.7		+0.3	+0.7	



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Persei. Mag. 3.1		$\rho$ Persei. Var. 3.4-4.2		$\mu$ Horologii. Mag. 5.2		$\theta$ Hydri. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 2 58	" ' s +53 10	h m 2 59	" ' s +38 31	h m 3 1	" ' s -60 2	h m 3 2	" ' s -72 13
Jan. 0.3	49.098	75.80	53.284	25.73	41.48	101.31	7.39	45.25
10.3	48.928	76.77	53.173	26.18	41.14	102.88	6.76	46.68
20.3	48.714	77.34	53.029	26.33	40.77	103.91	6.08	47.55
30.3	48.466	77.49	52.857	26.20	40.37	104.36	5.36	47.82
Feb. 9.2	48.198	77.22	52.667	25.79	39.95	104.24	4.62	47.50
19.2	47.923	76.53	52.470	25.09	39.54	103.55	3.89	46.60
Mar. 1.2	47.656	75.44	52.277	24.16	39.14	102.33	3.19	45.14
11.2	47.410	74.03	52.100	23.02	38.77	100.60	2.53	43.19
21.1	47.203	72.34	51.950	21.73	38.43	98.42	1.94	40.79
31.1	47.047	70.45	51.838	20.35	38.14	95.83	1.42	38.02
Apr. 10.1	46.952	68.44	51.773	18.94	37.92	92.90	1.00	34.89
20.0	46.925	66.40	51.761	17.57	37.76	89.70	0.70	31.54
30.0	46.972	64.41	51.806	16.31	37.67	86.28	0.50	27.99
May 10.0	47.092	62.55	51.909	15.21	37.67	82.73	0.42	24.35
20.0	47.285	60.90	52.068	14.32	37.74	79.14	0.46	20.69
29.9	47.546	59.49	52.281	13.68	37.89	75.58	0.63	17.10
June 8.9	47.868	58.40	52.543	13.30	38.11	72.14	0.91	13.68
18.9	48.242	57.64	52.846	13.21	38.40	68.89	1.30	10.48
28.9	48.658	57.25	53.181	13.42	38.75	65.93	1.79	7.60
July 8.8	49.107	57.21	53.542	13.91	39.15	63.34	2.37	5.12
18.8	49.575	57.54	53.918	14.67	39.59	61.18	3.02	3.10
28.8	50.055	58.23	54.302	15.66	40.06	59.52	3.72	1.60
Aug. 7.7	50.535	59.24	54.686	16.88	40.55	58.42	4.44	0.68
17.7	51.006	60.56	55.062	18.26	41.03	57.91	5.18	0.36
27.7	51.461	62.16	55.423	19.78	41.49	58.01	5.90	0.66
Sept. 6.7	51.891	63.98	55.764	21.43	41.93	58.71	6.57	1.59
16.6	52.291	66.01	56.082	23.13	42.34	60.00	7.19	3.10
26.6	52.657	68.19	56.372	24.87	42.70	61.85	7.74	5.14
Oct. 6.6	52.984	70.48	56.631	26.62	43.00	64.19	8.19	7.66
16.6	53.267	72.85	56.859	28.35	43.24	66.92	8.53	10.57
26.5	53.504	75.25	57.051	30.03	43.41	69.96	8.74	13.75
Nov. 5.5	53.691	77.63	57.207	31.63	43.50	73.18	8.83	17.08
15.5	53.827	79.94	57.324	33.14	43.51	76.46	8.79	20.45
25.4	53.907	82.14	57.400	34.52	43.45	79.69	8.62	23.73
Dec. 5.4	53.931	84.16	57.435	35.74	43.32	82.73	8.32	26.78
15.4	53.897	85.97	57.427	36.79	43.12	85.50	7.92	29.51
25.4	53.807	87.48	57.376	37.62	42.86	87.87	7.42	31.82
35.3	53.662	88.66	57.286	38.20	42.55	89.77	6.83	33.61
Mean Place	46.536	56.74	51.117	9.94	39.177	92.87	4.324	35.69
Sec $\delta$ , Tan $\delta$	1.669	+1.336	1.278	+0.796	2.003	-1.736	3.275	-3.119
$\nabla a$ , $D_{\infty} a$	+0.09	-0.06	+0.08	-0.04	+0.03	+0.08	0.00	+0.15
$D_{\infty} \delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Persei. (Algol.) Var. 2.1-3.2		$\delta$ Arietis. Mag. 4.5		12 Eridani. Mag. 4.0		48 H. Cephei. Mag. 5.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 2	° ' " +40 38	h m 3 6	° ' " +19 24	h m 3 8	° ' " -29 18	h m 3 9	° ' " +77 25
	s	"	s	"	s	"	s	"
Jan. 0.4	47.956	28.58	54.742	59.73	34.512	52.12	50.12	75.23
10.3	47.841 115	29.13 55	54.663 79	59.49 24	34.385 127	53.63 151	49.52 60	77.12 189
20.3	47.691 150	29.37 24	54.554 109	59.17 32	34.232 153	54.79 116	48.79 73	78.50 138
30.3	47.513 178	29.31 6	54.422 132	58.76 41	34.057 175	55.55 75	47.97 82	79.31 81
Feb. 9.2	47.315 198	28.94 37	54.274 148	58.26 50	33.868 189	55.90 36	47.10 87	79.53 22
	205	67	157	56	195	6	89	34
19.2	47.110	28.27	54.117	57.70	33.673	55.84	46.21	79.15
Mar. 1.2	46.908 202	27.34 93	53.960 157	57.09 61	33.479 194	55.38 46	45.35 86	78.19 96
11.2	46.721 187	26.17 117	53.814 146	56.46 63	33.297 182	54.52 86	44.57 78	76.70 140
21.1	46.563 158	24.84 133	53.689 125	55.85 61	33.136 161	53.27 125	43.88 69	74.75 195
31.1	46.444 119	23.40 144	53.593 96	55.29 56	33.004 132	51.67 160	43.32 56	72.42 233
	72	149	57	48	97	192	38	262
Apr. 10.1	46.372	21.91	53.536	54.81	32.907	49.75	42.94	69.80
20.1	46.355 17	20.44 147	53.521 15	54.47 34	32.853 54	47.53 222	42.72 22	67.02 278
30.0	46.397 42	19.07 137	53.553 32	54.29 18	32.846 7	45.08 245	42.69 3	64.16 286
May 10.0	46.497 100	17.85 122	53.634 81	54.29 0	32.888 42	42.42 266	42.69 18	61.33 283
20.0	46.657 160	16.83 102	53.763 129	54.50 21	32.980 92	39.62 280	43.22 35	58.65 268
	215	77	175	40	139	287	54	248
29.9	46.872	16.06	53.938	54.90	33.119	36.75	43.76	56.17
June 8.9	47.136 264	15.56 50	54.154 216	55.53 63	33.304 185	33.86 289	44.45 69	53.99 218
18.9	47.443 307	15.36 20	54.407 253	56.35 82	33.529 225	31.02 284	45.29 84	52.16 183
28.9	47.785 342	15.46 10	54.688 281	57.34 99	33.789 260	28.32 270	46.25 96	50.75 141
July 8.8	48.153 368	15.84 38	54.993 305	58.49 115	34.075 286	25.83 249	47.31 106	49.77 98
	385	67	318	126	307	222	112	50
18.8	48.538	16.51	55.311	59.75	34.382	23.61	48.43	49.27
28.8	48.931 393	17.43 92	55.637 326	61.08 133	34.700 318	21.71 190	49.60 117	49.23 4
Aug. 7.8	49.324 393	18.58 115	55.963 326	62.44 136	35.024 324	20.22 149	50.79 119	49.67 44
17.7	49.711 387	19.93 135	56.283 320	63.80 130	35.344 320	19.17 105	51.98 119	50.56 89
27.7	50.083 372	21.44 151	56.591 308	65.12 132	35.654 310	18.59 58	53.14 116	51.90 134
	352	164	293	124	294	8	111	175
Sept. 6.7	50.435	23.08	56.884	66.36	35.948	18.51	54.25	53.65
16.6	50.764 329	24.81 173	57.157 273	67.49 113	36.221 273	18.92 41	55.30 105	55.78 213
26.6	51.064 300	26.60 179	57.405 248	68.51 102	36.466 245	19.81 89	56.25 95	58.23 245
Oct. 6.6	51.333 269	28.41 181	57.630 225	69.38 87	36.681 215	21.13 132	57.11 86	60.98 275
16.6	51.570 237	30.22 181	57.827 197	70.11 73	36.864 183	22.84 171	57.85 74	63.96 298
	201	178	168	59	147	203	61	315
26.5	51.771 163	32.00 172	57.995 139	70.70 46	37.011 110	24.87 225	58.46 45	67.11 326
Nov. 5.5	51.934 123	33.72 162	58.134 107	71.16 33	37.121 73	27.12 239	58.91 31	70.37 329
15.5	52.057 81	35.34 150	58.241 74	71.49 21	37.194 34	29.51 243	59.22 14	73.66 324
25.5	52.138 37	36.84 136	58.315 42	71.70 10	37.228 3	31.94 239	59.36 4	76.90 310
Dec. 5.4	52.175 7	38.20 116	58.357 6	71.80 1	37.225 41	34.33 225	59.32 21	80.00 288
15.4	52.168	39.36	58.363	71.81	37.184	36.58	59.11	82.88
25.4	52.117 51	40.31 95	58.334 29	71.71 10	37.107 77	38.60 202	58.73 38	85.44 256
35.3	52.024 93	40.99 68	58.271 63	71.52 19	36.997 110	40.33 173	58.21 52	87.60 216
Mean Place	45.724	12.42	52.788	49.19	32.655	49.45	44.362	53.42
Sec $\delta$ , Tan $\delta$	1.318	+0.858	1.060	+0.352	1.147	-0.561	4.596	+4.486
$D_{\phi} \alpha$ , $D_{\alpha} \alpha$	+0.08	-0.04	+0.07	-0.02	+0.05	+0.03	+0.15	-0.20
$D_{\phi} \delta$ , $D_{\alpha} \delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.3

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♈ Arietis. Mag. 5.0		♋ G. Horologii. Mag. 5.7		♏ Eridani. Mag. 4.9		♈ Arietis. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m s 10	° ' " +20 44	h m s 10	° ' " -57 37	h m s 11	° ' " - 9 7	h m s 16	° ' " +20 50
Jan. 0.4	9.614	26.05	29.062	63.44	49.866	35.64	27.949	65.60
10.3	9.535 <sup>79</sup>	25.87 <sup>18</sup>	28.763 <sup>299</sup>	65.14 <sup>170</sup>	49.781 <sup>85</sup>	36.77 <sup>113</sup>	27.875 <sup>74</sup>	65.44 <sup>16</sup>
20.3	9.427 <sup>108</sup>	25.58 <sup>29</sup>	28.425 <sup>338</sup>	66.31 <sup>117</sup>	49.668 <sup>113</sup>	37.74 <sup>97</sup>	27.769 <sup>106</sup>	65.17 <sup>27</sup>
30.3	9.295 <sup>132</sup>	25.19 <sup>39</sup>	28.061 <sup>364</sup>	66.92 <sup>61</sup>	49.533 <sup>135</sup>	38.48 <sup>74</sup>	27.638 <sup>131</sup>	64.81 <sup>36</sup>
Feb. 9.2	9.145 <sup>150</sup>	24.72 <sup>47</sup>	27.682 <sup>379</sup>	66.96 <sup>4</sup>	49.383 <sup>150</sup>	39.00 <sup>52</sup>	27.489 <sup>149</sup>	64.36 <sup>45</sup>
19.2	8.986 <sup>159</sup>	24.16 <sup>56</sup>	27.300 <sup>382</sup>	66.44 <sup>52</sup>	49.225 <sup>158</sup>	39.27 <sup>27</sup>	27.329 <sup>160</sup>	63.83 <sup>53</sup>
Mar. 1.2	8.827 <sup>159</sup>	23.54 <sup>62</sup>	26.925 <sup>375</sup>	65.38 <sup>106</sup>	49.067 <sup>158</sup>	39.32 <sup>5</sup>	27.168 <sup>161</sup>	63.23 <sup>60</sup>
11.2	8.678 <sup>149</sup>	22.89 <sup>65</sup>	26.572 <sup>353</sup>	63.82 <sup>156</sup>	48.920 <sup>147</sup>	39.10 <sup>22</sup>	27.016 <sup>152</sup>	62.60 <sup>63</sup>
21.1	8.550 <sup>128</sup>	22.23 <sup>66</sup>	26.254 <sup>318</sup>	61.79 <sup>203</sup>	48.788 <sup>132</sup>	38.63 <sup>47</sup>	26.883 <sup>133</sup>	61.97 <sup>63</sup>
31.1	8.450 <sup>100</sup>	21.62 <sup>61</sup>	25.980 <sup>274</sup>	59.33 <sup>246</sup>	48.683 <sup>105</sup>	37.90 <sup>73</sup>	26.779 <sup>104</sup>	61.36 <sup>61</sup>
Apr. 10.1	8.389 <sup>61</sup>	21.09 <sup>53</sup>	25.760 <sup>220</sup>	56.54 <sup>279</sup>	48.611 <sup>72</sup>	36.93 <sup>97</sup>	26.712 <sup>67</sup>	60.83 <sup>53</sup>
20.1	8.371 <sup>18</sup>	20.68 <sup>41</sup>	25.602 <sup>158</sup>	53.43 <sup>311</sup>	48.580 <sup>31</sup>	35.71 <sup>122</sup>	26.688 <sup>24</sup>	60.41 <sup>43</sup>
30.0	8.399 <sup>28</sup>	20.42 <sup>26</sup>	25.515 <sup>87</sup>	50.11 <sup>332</sup>	48.591 <sup>11</sup>	34.27 <sup>144</sup>	26.711 <sup>23</sup>	60.14 <sup>27</sup>
May 10.0	8.477 <sup>78</sup>	20.33 <sup>9</sup>	25.498 <sup>17</sup>	46.63 <sup>348</sup>	48.647 <sup>56</sup>	32.63 <sup>164</sup>	26.783 <sup>72</sup>	60.03 <sup>11</sup>
20.0	8.604 <sup>127</sup>	20.43 <sup>10</sup>	25.557 <sup>59</sup>	43.08 <sup>355</sup>	48.750 <sup>103</sup>	30.79 <sup>184</sup>	26.903 <sup>120</sup>	60.11 <sup>8</sup>
29.9	8.776 <sup>172</sup>	20.76 <sup>33</sup>	25.688 <sup>131</sup>	39.55 <sup>353</sup>	48.895 <sup>145</sup>	28.83 <sup>196</sup>	27.070 <sup>167</sup>	60.41 <sup>30</sup>
June 8.9	8.991 <sup>215</sup>	21.28 <sup>52</sup>	25.889 <sup>201</sup>	36.10 <sup>345</sup>	49.081 <sup>186</sup>	26.75 <sup>208</sup>	27.280 <sup>210</sup>	60.90 <sup>49</sup>
18.9	9.243 <sup>252</sup>	22.02 <sup>74</sup>	26.155 <sup>266</sup>	32.84 <sup>326</sup>	49.302 <sup>221</sup>	24.64 <sup>211</sup>	27.527 <sup>247</sup>	61.60 <sup>70</sup>
28.9	9.524 <sup>281</sup>	22.93 <sup>91</sup>	26.480 <sup>325</sup>	29.82 <sup>302</sup>	49.555 <sup>253</sup>	22.52 <sup>212</sup>	27.804 <sup>277</sup>	62.47 <sup>87</sup>
July 8.8	9.829 <sup>305</sup>	24.00 <sup>107</sup>	26.853 <sup>373</sup>	27.16 <sup>266</sup>	49.829 <sup>274</sup>	20.47 <sup>205</sup>	28.106 <sup>302</sup>	63.49 <sup>102</sup>
18.8	10.148 <sup>319</sup>	25.20 <sup>120</sup>	27.264 <sup>411</sup>	24.90 <sup>226</sup>	50.120 <sup>291</sup>	18.54 <sup>193</sup>	28.424 <sup>318</sup>	64.65 <sup>116</sup>
28.8	10.476 <sup>328</sup>	26.48 <sup>128</sup>	27.703 <sup>439</sup>	23.14 <sup>176</sup>	50.421 <sup>301</sup>	16.78 <sup>176</sup>	28.751 <sup>327</sup>	65.89 <sup>124</sup>
Aug. 7.8	10.805 <sup>329</sup>	27.81 <sup>133</sup>	28.157 <sup>454</sup>	21.90 <sup>124</sup>	50.725 <sup>304</sup>	15.27 <sup>151</sup>	29.079 <sup>328</sup>	67.18 <sup>129</sup>
17.7	11.128 <sup>323</sup>	29.15 <sup>134</sup>	28.613 <sup>456</sup>	21.25 <sup>65</sup>	51.023 <sup>298</sup>	14.02 <sup>125</sup>	29.403 <sup>324</sup>	68.48 <sup>130</sup>
27.7	11.441 <sup>313</sup>	30.46 <sup>131</sup>	29.059 <sup>446</sup>	21.21 <sup>4</sup>	51.312 <sup>280</sup>	13.10 <sup>92</sup>	29.718 <sup>315</sup>	69.75 <sup>127</sup>
Sept. 6.7	11.736 <sup>295</sup>	31.71 <sup>125</sup>	29.484 <sup>425</sup>	21.77 <sup>56</sup>	51.585 <sup>273</sup>	12.51 <sup>59</sup>	30.017 <sup>299</sup>	70.96 <sup>121</sup>
16.6	12.012 <sup>276</sup>	32.86 <sup>115</sup>	29.877 <sup>393</sup>	22.93 <sup>116</sup>	51.841 <sup>256</sup>	12.29 <sup>22</sup>	30.297 <sup>280</sup>	72.08 <sup>112</sup>
26.6	12.266 <sup>254</sup>	33.90 <sup>104</sup>	30.227 <sup>350</sup>	24.65 <sup>172</sup>	52.074 <sup>233</sup>	12.42 <sup>13</sup>	30.555 <sup>258</sup>	73.10 <sup>103</sup>
Oct. 6.6	12.495 <sup>229</sup>	34.82 <sup>92</sup>	30.524 <sup>297</sup>	26.87 <sup>222</sup>	52.282 <sup>208</sup>	12.89 <sup>47</sup>	30.790 <sup>235</sup>	73.99 <sup>89</sup>
16.6	12.696 <sup>201</sup>	35.61 <sup>79</sup>	30.762 <sup>238</sup>	29.51 <sup>264</sup>	52.463 <sup>181</sup>	13.67 <sup>78</sup>	30.997 <sup>207</sup>	74.76 <sup>77</sup>
26.5	12.868 <sup>172</sup>	36.26 <sup>65</sup>	30.938 <sup>176</sup>	32.48 <sup>297</sup>	52.614 <sup>151</sup>	14.71 <sup>104</sup>	31.177 <sup>180</sup>	75.39 <sup>63</sup>
Nov. 5.5	13.011 <sup>143</sup>	36.78 <sup>52</sup>	31.046 <sup>108</sup>	35.65 <sup>317</sup>	52.736 <sup>122</sup>	15.97 <sup>126</sup>	31.326 <sup>149</sup>	75.90 <sup>51</sup>
15.5	13.122 <sup>111</sup>	37.18 <sup>40</sup>	31.082 <sup>30</sup>	38.92 <sup>327</sup>	52.827 <sup>91</sup>	17.39 <sup>142</sup>	31.444 <sup>118</sup>	76.29 <sup>39</sup>
25.5	13.200 <sup>78</sup>	37.46 <sup>28</sup>	31.051 <sup>31</sup>	42.16 <sup>324</sup>	52.886 <sup>59</sup>	18.88 <sup>149</sup>	31.529 <sup>85</sup>	76.56 <sup>27</sup>
Dec. 5.4	13.245 <sup>45</sup>	37.63 <sup>17</sup>	30.950 <sup>101</sup>	45.24 <sup>308</sup>	52.912 <sup>26</sup>	20.40 <sup>152</sup>	31.580 <sup>51</sup>	76.73 <sup>17</sup>
15.4	13.253 <sup>8</sup>	37.70 <sup>7</sup>	30.787 <sup>163</sup>	48.07 <sup>283</sup>	52.906 <sup>6</sup>	21.88 <sup>148</sup>	31.594 <sup>14</sup>	76.81 <sup>8</sup>
25.4	13.226 <sup>27</sup>	37.67 <sup>3</sup>	30.565 <sup>222</sup>	50.53 <sup>246</sup>	52.867 <sup>39</sup>	23.28 <sup>140</sup>	31.573 <sup>21</sup>	76.79 <sup>3</sup>
35.3	13.165 <sup>61</sup>	37.54 <sup>13</sup>	30.292 <sup>273</sup>	52.55 <sup>202</sup>	52.797 <sup>70</sup>	24.55 <sup>127</sup>	31.517 <sup>56</sup>	76.67 <sup>12</sup>
Mean Place	7.630	15.26	26.793	55.60	48.028	38.13	25.929	54.99
Sec $\delta$ , Tan $\delta$	1.069	+0.379	1.868	-1.577	1.013	-0.161	1.070	+0.381
$D\psi\alpha$ , $D_{\omega}\alpha$	+0.07	-0.02	+0.03	+0.07	+0.06	+0.01	+0.07	-0.02
$D\psi\delta$ , $D_{\omega}\delta$	+0.3	+0.7	+0.3	+0.7	+0.3	+0.7	+0.3	+0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Eridani. Mag. 4.3		$\zeta$ Hydri. Mag. 5.5		$\alpha$ Persei. Mag. 1.9		$\theta$ Tauri. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 16	° ' -43 22	h m 3 17	° ' -77 40	h m 3 18	° ' +49 34	h m 3 20	° ' + 8 44
	s	"	s	"	s	"	s	"
Jan. 0.4	38.765	77.02	64.19	100.85	25.954	17.71	22.605	22.58
10.3	38.592 <sup>173</sup>	78.76 <sup>174</sup>	63.26 <sup>93</sup>	102.44 <sup>159</sup>	25.822 <sup>132</sup>	18.70 <sup>99</sup>	22.535 <sup>70</sup>	21.97 <sup>61</sup>
20.3	38.388 <sup>204</sup>	80.05 <sup>129</sup>	62.24 <sup>102</sup>	103.47 <sup>103</sup>	25.644 <sup>178</sup>	19.33 <sup>63</sup>	22.436 <sup>99</sup>	21.38 <sup>59</sup>
30.3	38.161 <sup>227</sup>	80.84 <sup>79</sup>	61.16 <sup>108</sup>	103.88 <sup>41</sup>	25.429 <sup>215</sup>	19.59 <sup>26</sup>	22.312 <sup>124</sup>	20.82 <sup>56</sup>
Feb. 9.3	37.917 <sup>244</sup>	81.14 <sup>30</sup>	60.06 <sup>110</sup>	103.73 <sup>15</sup>	25.190 <sup>239</sup>	19.47 <sup>12</sup>	22.170 <sup>142</sup>	20.30 <sup>52</sup>
	253	22	111	74	253	50	152	47
19.2	37.664	80.92	58.95	102.99	24.937	18.97	22.018	19.83
Mar. 1.2	37.415 <sup>249</sup>	80.22 <sup>70</sup>	57.88 <sup>107</sup>	101.69 <sup>130</sup>	24.685 <sup>252</sup>	18.11 <sup>86</sup>	21.863 <sup>155</sup>	19.43 <sup>40</sup>
11.2	37.180 <sup>235</sup>	79.02 <sup>120</sup>	56.87 <sup>101</sup>	99.89 <sup>180</sup>	24.449 <sup>236</sup>	16.92 <sup>119</sup>	21.716 <sup>147</sup>	19.11 <sup>32</sup>
21.1	36.968 <sup>212</sup>	77.40 <sup>162</sup>	55.94 <sup>93</sup>	97.65 <sup>224</sup>	24.243 <sup>206</sup>	15.47 <sup>145</sup>	21.588 <sup>128</sup>	18.91 <sup>20</sup>
31.1	36.788 <sup>180</sup>	75.37 <sup>203</sup>	55.12 <sup>82</sup>	94.97 <sup>268</sup>	24.080 <sup>163</sup>	13.81 <sup>166</sup>	21.484 <sup>104</sup>	18.83 <sup>8</sup>
	137	238	70	299	109	179	69	6
Apr. 10.1	36.651	72.99	54.42	91.98	23.971	12.02	21.415	18.89
20.1	36.561 <sup>90</sup>	70.28 <sup>271</sup>	53.87 <sup>55</sup>	88.72 <sup>326</sup>	23.924 <sup>47</sup>	10.19 <sup>183</sup>	21.385 <sup>30</sup>	19.13 <sup>24</sup>
30.0	36.522 <sup>39</sup>	67.34 <sup>294</sup>	53.48 <sup>39</sup>	85.29 <sup>343</sup>	23.943 <sup>19</sup>	8.37 <sup>182</sup>	21.400 <sup>15</sup>	19.55 <sup>42</sup>
May 10.0	36.540 <sup>18</sup>	64.20 <sup>314</sup>	53.25 <sup>23</sup>	81.71 <sup>358</sup>	24.031 <sup>88</sup>	6.67 <sup>170</sup>	21.461 <sup>61</sup>	20.15 <sup>60</sup>
20.0	36.616 <sup>76</sup>	60.94 <sup>326</sup>	53.19 <sup>6</sup>	78.08 <sup>363</sup>	24.187 <sup>156</sup>	5.12 <sup>155</sup>	21.568 <sup>107</sup>	20.95 <sup>80</sup>
	132	330	12	356	221	134	151	98
30.0	36.748	57.64	53.31	74.52	24.408	3.78	21.719	21.93
June 8.9	36.933 <sup>185</sup>	54.37 <sup>327</sup>	53.59 <sup>28</sup>	71.09 <sup>343</sup>	24.689 <sup>281</sup>	2.72 <sup>106</sup>	21.910 <sup>191</sup>	23.08 <sup>115</sup>
18.9	37.168 <sup>235</sup>	51.20 <sup>317</sup>	54.04 <sup>45</sup>	67.89 <sup>320</sup>	25.021 <sup>332</sup>	1.96 <sup>76</sup>	22.139 <sup>229</sup>	24.36 <sup>128</sup>
28.9	37.445 <sup>277</sup>	48.24 <sup>296</sup>	54.64 <sup>60</sup>	64.96 <sup>293</sup>	25.395 <sup>374</sup>	1.51 <sup>45</sup>	22.397 <sup>258</sup>	25.75 <sup>139</sup>
July 8.8	37.758 <sup>313</sup>	45.53 <sup>271</sup>	55.37 <sup>73</sup>	62.42 <sup>254</sup>	25.803 <sup>408</sup>	1.40 <sup>11</sup>	22.678 <sup>281</sup>	27.21 <sup>146</sup>
	341	235	84	210	431	22	297	148
18.8	38.099	43.18	56.21	60.32	26.234	1.62	22.975	28.69
28.8	38.458 <sup>359</sup>	41.25 <sup>193</sup>	57.14 <sup>93</sup>	58.74 <sup>158</sup>	26.680 <sup>446</sup>	2.14 <sup>52</sup>	23.283 <sup>308</sup>	30.16 <sup>147</sup>
Aug. 7.8	38.827 <sup>369</sup>	39.80 <sup>145</sup>	58.12 <sup>98</sup>	57.72 <sup>102</sup>	27.130 <sup>450</sup>	2.97 <sup>83</sup>	23.593 <sup>310</sup>	31.56 <sup>140</sup>
17.7	39.196 <sup>369</sup>	38.87 <sup>93</sup>	59.13 <sup>101</sup>	57.30 <sup>42</sup>	27.575 <sup>445</sup>	4.08 <sup>111</sup>	23.898 <sup>305</sup>	32.85 <sup>129</sup>
27.7	39.558 <sup>362</sup>	38.48 <sup>39</sup>	60.14 <sup>101</sup>	57.46 <sup>16</sup>	28.009 <sup>434</sup>	5.43 <sup>135</sup>	24.195 <sup>297</sup>	33.99 <sup>114</sup>
	344	19	96	81	416	157	284	96
Sept. 6.7	39.902	38.67	61.10	58.27	28.425	7.00	24.479	34.95
16.7	40.224 <sup>322</sup>	39.42 <sup>75</sup>	62.00 <sup>90</sup>	59.70 <sup>143</sup>	28.817 <sup>392</sup>	8.74 <sup>174</sup>	24.744 <sup>265</sup>	35.71 <sup>76</sup>
26.6	40.514 <sup>290</sup>	40.71 <sup>129</sup>	62.80 <sup>80</sup>	61.63 <sup>193</sup>	29.179 <sup>332</sup>	10.62 <sup>188</sup>	24.990 <sup>246</sup>	36.26 <sup>55</sup>
Oct. 6.6	40.770 <sup>256</sup>	42.50 <sup>179</sup>	63.47 <sup>67</sup>	64.09 <sup>246</sup>	29.509 <sup>330</sup>	12.61 <sup>199</sup>	25.212 <sup>222</sup>	36.58 <sup>32</sup>
16.6	40.984 <sup>214</sup>	44.70 <sup>220</sup>	63.99 <sup>52</sup>	66.93 <sup>284</sup>	29.801 <sup>292</sup>	14.68 <sup>207</sup>	25.409 <sup>197</sup>	36.71 <sup>13</sup>
	169	255	34	315	252	212	170	7
26.5	41.153	47.25	64.33	70.08	30.053	16.80	25.579	36.64
Nov. 5.5	41.277 <sup>124</sup>	50.03 <sup>278</sup>	64.50 <sup>17</sup>	73.41 <sup>333</sup>	30.261 <sup>208</sup>	18.90 <sup>210</sup>	25.722 <sup>143</sup>	36.40 <sup>24</sup>
15.5	41.352 <sup>75</sup>	52.96 <sup>293</sup>	64.46 <sup>4</sup>	76.80 <sup>339</sup>	30.422 <sup>161</sup>	20.97 <sup>207</sup>	25.834 <sup>112</sup>	36.03 <sup>37</sup>
25.5	41.379 <sup>27</sup>	55.91 <sup>295</sup>	64.24 <sup>22</sup>	80.13 <sup>333</sup>	30.532 <sup>110</sup>	22.96 <sup>199</sup>	25.914 <sup>80</sup>	35.54 <sup>49</sup>
Dec. 5.4	41.358 <sup>21</sup>	58.78 <sup>287</sup>	63.84 <sup>40</sup>	83.25 <sup>312</sup>	30.590 <sup>58</sup>	24.82 <sup>186</sup>	25.963 <sup>49</sup>	34.98 <sup>56</sup>
	68	265	58	283	1	167	14	60
15.4	41.290	61.43	63.26	86.08	30.591	26.49	25.977	34.38
25.4	41.178 <sup>112</sup>	63.82 <sup>239</sup>	62.53 <sup>73</sup>	88.51 <sup>243</sup>	30.539 <sup>52</sup>	27.93 <sup>144</sup>	25.957 <sup>20</sup>	33.75 <sup>63</sup>
35.4	41.027 <sup>151</sup>	65.83 <sup>201</sup>	61.67 <sup>86</sup>	90.46 <sup>195</sup>	30.433 <sup>106</sup>	29.09 <sup>116</sup>	25.905 <sup>52</sup>	33.12 <sup>63</sup>
Mean Place	36.756	71.60	60.035	91.67	23.335	0.45	20.663	15.33
Sec $\delta$ , Tan $\delta$	1.376	-0.945	4.690	-4.582	1.542	+1.174	1.012	+0.154
$D\psi\alpha$ , $D_\omega\alpha$	+0.04	+0.04	-0.03	+0.20	+0.08	-0.05	+0.06	-0.01
$D\psi\delta$ , $D_\omega\delta$	+0.3	+0.8	+0.3	+0.8	+0.3	+0.8	+0.3	+0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	2 H. Camelop. Mag. 4.4		ξ Tauri. Mag. 3.8		f Tauri. Mag. 4.3		ε Eridani. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 22	° ' " +59 39	h m 3 22	° ' " + 9 26	h m 3 26	° ' " +12 39	h m 3 29	° ' " - 9 43
	s	"	s	"	s	"	s	"
Jan. 0.4	23.405	26.93	42.084	45.68	19.302	19.25	3.035	76.12
10.3	23.215 <sup>190</sup>	28.33 <sup>140</sup>	42.016 <sup>68</sup>	45.09 <sup>59</sup>	19.236 <sup>66</sup>	18.79 <sup>46</sup>	2.955 <sup>80</sup>	77.34 <sup>122</sup>
20.3	22.967 <sup>248</sup>	29.32 <sup>99</sup>	41.919 <sup>97</sup>	44.52 <sup>57</sup>	19.140 <sup>96</sup>	18.31 <sup>48</sup>	2.844 <sup>111</sup>	78.37 <sup>103</sup>
30.3	22.672 <sup>295</sup>	29.87 <sup>55</sup>	41.796 <sup>123</sup>	43.98 <sup>54</sup>	19.016 <sup>124</sup>	17.83 <sup>48</sup>	2.709 <sup>135</sup>	79.16 <sup>79</sup>
Feb. 9.3	22.346 <sup>326</sup>	29.95 <sup>8</sup>	41.654 <sup>142</sup>	43.47 <sup>51</sup>	18.873 <sup>143</sup>	17.34 <sup>49</sup>	2.557 <sup>152</sup>	79.73 <sup>57</sup>
	342	40	152	47	154	48	164	31
19.2	22.004	29.55	41.502	43.00	18.719	16.86	2.393	80.04
Mar. 1.2	21.664 <sup>340</sup>	28.71 <sup>84</sup>	41.347 <sup>155</sup>	42.59 <sup>41</sup>	18.562 <sup>157</sup>	16.41 <sup>45</sup>	2.228 <sup>165</sup>	80.11 <sup>7</sup>
11.2	21.344 <sup>320</sup>	27.45 <sup>126</sup>	41.200 <sup>147</sup>	42.26 <sup>33</sup>	18.411 <sup>151</sup>	16.01 <sup>40</sup>	2.070 <sup>158</sup>	79.91 <sup>20</sup>
21.1	21.063 <sup>281</sup>	25.83 <sup>162</sup>	41.069 <sup>131</sup>	42.04 <sup>22</sup>	18.277 <sup>134</sup>	15.67 <sup>34</sup>	1.927 <sup>143</sup>	79.45 <sup>46</sup>
31.1	20.836 <sup>227</sup>	23.94 <sup>189</sup>	40.964 <sup>105</sup>	41.93 <sup>11</sup>	18.170 <sup>107</sup>	15.43 <sup>24</sup>	1.810 <sup>117</sup>	78.73 <sup>72</sup>
	160	211	70	3	74	12	85	96
Apr. 10.1	20.676	21.83	40.894	41.96	18.096	15.31	1.725	77.77
20.1	20.595 <sup>81</sup>	19.61 <sup>222</sup>	40.862 <sup>32</sup>	42.16 <sup>20</sup>	18.063 <sup>33</sup>	15.32 <sup>1</sup>	1.677 <sup>48</sup>	76.55 <sup>122</sup>
30.0	20.599 <sup>4</sup>	17.36 <sup>225</sup>	40.875 <sup>13</sup>	42.53 <sup>37</sup>	18.074 <sup>11</sup>	15.51 <sup>19</sup>	1.673 <sup>4</sup>	75.11 <sup>144</sup>
May 10.0	20.689 <sup>90</sup>	15.17 <sup>219</sup>	40.933 <sup>58</sup>	43.08 <sup>55</sup>	18.131 <sup>57</sup>	15.87 <sup>36</sup>	1.714 <sup>41</sup>	73.45 <sup>166</sup>
20.0	20.864 <sup>175</sup>	13.13 <sup>204</sup>	41.039 <sup>106</sup>	43.84 <sup>76</sup>	18.236 <sup>105</sup>	16.42 <sup>55</sup>	1.801 <sup>87</sup>	71.62 <sup>183</sup>
	257	185	150	93	149	74	131	197
30.0	21.121	11.28	41.189	44.77	18.385	17.16	1.932	69.65
June 8.9	21.453 <sup>332</sup>	9.71 <sup>157</sup>	41.379 <sup>190</sup>	45.85 <sup>108</sup>	18.576 <sup>191</sup>	18.07 <sup>91</sup>	2.105 <sup>173</sup>	67.59 <sup>206</sup>
18.9	21.851 <sup>328</sup>	8.46 <sup>125</sup>	41.607 <sup>228</sup>	47.11 <sup>126</sup>	18.804 <sup>228</sup>	19.13 <sup>106</sup>	2.314 <sup>209</sup>	65.46 <sup>213</sup>
28.9	22.305 <sup>454</sup>	7.54 <sup>92</sup>	41.865 <sup>258</sup>	48.45 <sup>134</sup>	19.063 <sup>259</sup>	20.33 <sup>120</sup>	2.554 <sup>240</sup>	63.36 <sup>210</sup>
July 8.8	22.802 <sup>497</sup>	7.01 <sup>53</sup>	42.146 <sup>281</sup>	49.88 <sup>143</sup>	19.346 <sup>283</sup>	21.62 <sup>129</sup>	2.820 <sup>266</sup>	61.32 <sup>204</sup>
	529	16	207	145	301	135	284	193
18.8	23.331	6.85	42.443	51.33	19.647	22.97	3.104	59.39
28.8	23.880 <sup>549</sup>	7.07 <sup>22</sup>	42.751 <sup>308</sup>	52.77 <sup>144</sup>	19.957 <sup>310</sup>	24.33 <sup>136</sup>	3.398 <sup>294</sup>	57.66 <sup>173</sup>
Aug. 7.8	24.438 <sup>558</sup>	7.66 <sup>59</sup>	43.061 <sup>310</sup>	54.16 <sup>139</sup>	20.271 <sup>314</sup>	25.66 <sup>133</sup>	3.698 <sup>300</sup>	56.13 <sup>153</sup>
17.7	24.993 <sup>555</sup>	8.60 <sup>94</sup>	43.369 <sup>308</sup>	55.45 <sup>129</sup>	20.582 <sup>311</sup>	26.92 <sup>126</sup>	3.997 <sup>299</sup>	54.91 <sup>122</sup>
27.7	25.535 <sup>542</sup>	9.87 <sup>127</sup>	43.667 <sup>298</sup>	56.58 <sup>113</sup>	20.884 <sup>302</sup>	28.07 <sup>115</sup>	4.287 <sup>290</sup>	54.00 <sup>91</sup>
	522	157	286	97	290	102	278	55
Sept. 6.7	26.057	11.44	43.953	57.55	21.174	29.09	4.565	53.45
16.7	26.551 <sup>494</sup>	13.27 <sup>183</sup>	44.222 <sup>269</sup>	58.32 <sup>77</sup>	21.448 <sup>274</sup>	29.94 <sup>85</sup>	4.825 <sup>260</sup>	53.26 <sup>19</sup>
26.6	27.009 <sup>458</sup>	15.34 <sup>207</sup>	44.468 <sup>246</sup>	58.89 <sup>57</sup>	21.701 <sup>253</sup>	30.62 <sup>68</sup>	5.065 <sup>240</sup>	53.44 <sup>18</sup>
Oct. 6.6	27.426 <sup>417</sup>	17.59 <sup>225</sup>	44.693 <sup>225</sup>	59.26 <sup>37</sup>	21.932 <sup>231</sup>	31.10 <sup>48</sup>	5.281 <sup>216</sup>	53.95 <sup>51</sup>
16.6	27.797 <sup>371</sup>	19.08 <sup>239</sup>	44.892 <sup>199</sup>	59.40 <sup>14</sup>	22.137 <sup>205</sup>	31.40 <sup>30</sup>	5.472 <sup>191</sup>	54.80 <sup>85</sup>
	318	250	173	4	181	14	163	113
26.5	28.115	22.48	45.065	59.36	22.318	31.54	5.635	55.93
Nov. 5.5	28.375 <sup>260</sup>	25.03 <sup>255</sup>	45.210 <sup>145</sup>	59.16 <sup>20</sup>	22.469 <sup>151</sup>	31.52 <sup>2</sup>	5.769 <sup>134</sup>	57.27 <sup>134</sup>
15.5	28.573 <sup>198</sup>	27.59 <sup>256</sup>	45.325 <sup>115</sup>	58.82 <sup>34</sup>	22.590 <sup>121</sup>	31.37 <sup>15</sup>	5.870 <sup>101</sup>	58.77 <sup>150</sup>
25.5	28.702 <sup>129</sup>	30.08 <sup>249</sup>	45.408 <sup>83</sup>	58.37 <sup>45</sup>	22.681 <sup>91</sup>	31.11 <sup>26</sup>	5.940 <sup>70</sup>	60.36 <sup>159</sup>
Dec. 5.4	28.763 <sup>61</sup>	32.46 <sup>238</sup>	45.460 <sup>52</sup>	57.85 <sup>52</sup>	22.737 <sup>56</sup>	30.78 <sup>33</sup>	5.976 <sup>36</sup>	61.98 <sup>162</sup>
	12	218	16	57	22	40	3	158
15.4	28.751	34.64	45.476	57.28	22.759	30.38	5.979	63.56
25.4	28.666 <sup>85</sup>	36.58 <sup>194</sup>	45.459 <sup>17</sup>	56.69 <sup>59</sup>	22.745 <sup>14</sup>	29.94 <sup>44</sup>	5.947 <sup>32</sup>	65.05 <sup>149</sup>
35.4	28.512 <sup>154</sup>	38.19 <sup>161</sup>	45.408 <sup>51</sup>	56.08 <sup>61</sup>	22.697 <sup>48</sup>	29.48 <sup>46</sup>	5.881 <sup>66</sup>	66.41 <sup>136</sup>
Mean Place	20.239	8.13	40.128	38.30	17.304	11.11	1.141	78.21
Sec δ, Tan δ	1.979	+1.708	1.014	+0.166	1.025	+0.224	1.015	-0.172
Dψ α, Dω α	+0.10	-0.07	+0.06	-0.01	+0.06	-0.01	+0.06	+0.01
Dψ δ, Dω δ	+0.3	+0.8	+0.3	+0.8	+0.2	+0.8	+0.2	+0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\tau^5$ Eridani. Mag. 4.3		$\delta$ Persei. Mag. 3.1		$\delta$ Eridani. Mag. 3.7		$\gamma$ Persei. Mag. 3.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 30	° ' -21 54	h m 3 37	° ' +47 31	h m 3 39	° ' -10 2	h m 3 39	° ' +42 19
	s	"	s	"	s	"	s	"
Jan. 0.4	9.119	39.15	3.208	39.42	18.243	35.44	35.532	17.52
10.3	9.023 <sup>96</sup>	40.72 <sup>157</sup>	3.102 <sup>106</sup>	40.44 <sup>102</sup>	18.171 <sup>72</sup>	36.72 <sup>128</sup>	35.444 <sup>88</sup>	18.33 <sup>81</sup>
20.3	8.896 <sup>127</sup>	41.98 <sup>126</sup>	2.949 <sup>153</sup>	41.15 <sup>71</sup>	18.069 <sup>102</sup>	37.79 <sup>107</sup>	35.312 <sup>132</sup>	18.88 <sup>55</sup>
30.3	8.744 <sup>152</sup>	42.92 <sup>94</sup>	2.756 <sup>193</sup>	41.53 <sup>38</sup>	17.939 <sup>130</sup>	38.64 <sup>85</sup>	35.142 <sup>170</sup>	19.14 <sup>26</sup>
Feb. 9.3	8.573 <sup>171</sup>	43.51 <sup>59</sup>	2.532 <sup>224</sup>	41.56 <sup>3</sup>	17.789 <sup>150</sup>	39.24 <sup>60</sup>	34.944 <sup>198</sup>	19.10 <sup>4</sup>
	181	23	240	33	163	37	216	35
19.2	8.392	43.74	2.292	41.23	17.626	39.61	34.728	18.75
Mar. 1.2	8.209 <sup>183</sup>	43.61 <sup>13</sup>	2.046 <sup>246</sup>	40.55 <sup>68</sup>	17.459 <sup>167</sup>	39.72 <sup>11</sup>	34.507 <sup>221</sup>	18.11 <sup>64</sup>
11.2	8.032 <sup>177</sup>	43.14 <sup>47</sup>	1.811 <sup>235</sup>	39.56 <sup>99</sup>	17.297 <sup>162</sup>	39.55 <sup>17</sup>	34.296 <sup>211</sup>	17.21 <sup>90</sup>
21.2	7.872 <sup>160</sup>	42.30 <sup>84</sup>	1.601 <sup>210</sup>	38.30 <sup>126</sup>	17.148 <sup>149</sup>	39.13 <sup>42</sup>	34.104 <sup>192</sup>	16.08 <sup>113</sup>
31.1	7.736 <sup>136</sup>	41.13 <sup>117</sup>	1.427 <sup>174</sup>	36.83 <sup>147</sup>	17.023 <sup>125</sup>	38.44 <sup>60</sup>	33.947 <sup>157</sup>	14.79 <sup>129</sup>
	102	145	125	162	96	93	114	141
Apr. 10.1	7.634 <sup>61</sup>	39.68 <sup>177</sup>	1.302 <sup>67</sup>	35.21 <sup>169</sup>	16.927 <sup>58</sup>	37.51 <sup>119</sup>	33.833 <sup>62</sup>	13.38 <sup>146</sup>
20.1	7.570 <sup>20</sup>	37.91 <sup>203</sup>	1.235 <sup>4</sup>	33.52 <sup>170</sup>	16.869 <sup>16</sup>	36.32 <sup>142</sup>	33.771 <sup>3</sup>	11.92 <sup>148</sup>
30.0	7.550 <sup>26</sup>	35.88 <sup>223</sup>	1.231 <sup>61</sup>	31.82 <sup>162</sup>	16.853 <sup>29</sup>	34.90 <sup>164</sup>	33.768 <sup>56</sup>	10.49 <sup>136</sup>
May 10.0	7.576 <sup>74</sup>	33.65 <sup>240</sup>	1.292 <sup>127</sup>	30.20 <sup>149</sup>	16.882 <sup>75</sup>	33.26 <sup>182</sup>	33.824 <sup>118</sup>	9.13 <sup>122</sup>
20.0	7.650 <sup>120</sup>	31.25 <sup>252</sup>	1.419 <sup>192</sup>	28.71 <sup>132</sup>	16.957 <sup>119</sup>	31.44 <sup>196</sup>	33.942 <sup>176</sup>	7.91 <sup>104</sup>
30.0	7.770 <sup>164</sup>	28.73 <sup>260</sup>	1.611 <sup>249</sup>	27.39 <sup>107</sup>	17.076 <sup>161</sup>	29.48 <sup>207</sup>	34.118 <sup>230</sup>	6.87 <sup>81</sup>
June 8.9	7.934 <sup>204</sup>	26.13 <sup>257</sup>	1.860 <sup>302</sup>	26.32 <sup>81</sup>	17.237 <sup>200</sup>	27.41 <sup>214</sup>	34.348 <sup>279</sup>	6.06 <sup>57</sup>
18.9	8.138 <sup>237</sup>	23.56 <sup>252</sup>	2.162 <sup>347</sup>	25.51 <sup>52</sup>	17.437 <sup>232</sup>	25.27 <sup>214</sup>	34.627 <sup>320</sup>	5.49 <sup>29</sup>
28.9	8.375 <sup>266</sup>	21.04 <sup>239</sup>	2.509 <sup>381</sup>	24.99 <sup>23</sup>	17.669 <sup>259</sup>	23.13 <sup>207</sup>	34.947 <sup>353</sup>	5.20 <sup>4</sup>
July 8.9	8.641 <sup>287</sup>	18.65 <sup>217</sup>	2.890 <sup>408</sup>	24.76 <sup>7</sup>	17.928 <sup>278</sup>	21.06 <sup>197</sup>	35.300 <sup>377</sup>	5.16 <sup>24</sup>
18.8	8.928 <sup>302</sup>	16.48 <sup>192</sup>	3.298 <sup>425</sup>	24.83 <sup>37</sup>	18.206 <sup>292</sup>	19.09 <sup>179</sup>	35.677 <sup>392</sup>	5.40 <sup>48</sup>
28.8	9.230 <sup>308</sup>	14.56 <sup>158</sup>	3.723 <sup>433</sup>	25.20 <sup>65</sup>	18.498 <sup>298</sup>	17.30 <sup>156</sup>	36.069 <sup>402</sup>	5.88 <sup>72</sup>
Aug. 7.8	9.538 <sup>308</sup>	12.98 <sup>120</sup>	4.156 <sup>433</sup>	25.85 <sup>89</sup>	18.796 <sup>300</sup>	15.74 <sup>128</sup>	36.471 <sup>399</sup>	6.60 <sup>93</sup>
17.7	9.846 <sup>301</sup>	11.78 <sup>78</sup>	4.589 <sup>426</sup>	26.74 <sup>113</sup>	19.096 <sup>294</sup>	14.46 <sup>96</sup>	36.870 <sup>394</sup>	7.53 <sup>112</sup>
27.7	10.147 <sup>290</sup>	11.00 <sup>34</sup>	5.015 <sup>412</sup>	27.87 <sup>132</sup>	19.390 <sup>283</sup>	13.50 <sup>61</sup>	37.264 <sup>381</sup>	8.65 <sup>127</sup>
Sept. 6.7	10.437 <sup>273</sup>	10.66 <sup>12</sup>	5.427 <sup>392</sup>	29.19 <sup>150</sup>	19.673 <sup>269</sup>	12.89 <sup>23</sup>	37.645 <sup>363</sup>	9.92 <sup>139</sup>
16.7	10.710 <sup>251</sup>	10.78 <sup>57</sup>	5.819 <sup>368</sup>	30.69 <sup>164</sup>	19.942 <sup>249</sup>	12.66 <sup>13</sup>	38.008 <sup>341</sup>	11.31 <sup>149</sup>
26.6	10.961 <sup>226</sup>	11.35 <sup>100</sup>	6.187 <sup>338</sup>	32.33 <sup>175</sup>	20.191 <sup>228</sup>	12.79 <sup>49</sup>	38.349 <sup>314</sup>	12.80 <sup>156</sup>
Oct. 6.6	11.187 <sup>197</sup>	12.35 <sup>137</sup>	6.525 <sup>306</sup>	34.08 <sup>184</sup>	20.419 <sup>203</sup>	13.28 <sup>82</sup>	38.663 <sup>286</sup>	14.36 <sup>160</sup>
16.6	11.384 <sup>167</sup>	13.72 <sup>170</sup>	6.831 <sup>269</sup>	35.92 <sup>188</sup>	20.622 <sup>176</sup>	14.10 <sup>111</sup>	38.949 <sup>251</sup>	15.96 <sup>163</sup>
26.6	11.551 <sup>135</sup>	15.42 <sup>195</sup>	7.100 <sup>229</sup>	37.80 <sup>190</sup>	20.798 <sup>148</sup>	15.21 <sup>133</sup>	39.200 <sup>216</sup>	17.59 <sup>162</sup>
Nov. 5.5	11.686 <sup>101</sup>	17.37 <sup>213</sup>	7.329 <sup>184</sup>	39.70 <sup>189</sup>	20.946 <sup>117</sup>	16.54 <sup>150</sup>	39.416 <sup>175</sup>	19.21 <sup>160</sup>
15.5	11.787 <sup>65</sup>	19.50 <sup>221</sup>	7.513 <sup>136</sup>	41.59 <sup>184</sup>	21.063 <sup>84</sup>	18.04 <sup>162</sup>	39.591 <sup>133</sup>	20.81 <sup>153</sup>
25.5	11.852 <sup>28</sup>	21.71 <sup>220</sup>	7.649 <sup>85</sup>	43.43 <sup>174</sup>	21.147 <sup>52</sup>	19.66 <sup>166</sup>	39.724 <sup>86</sup>	22.34 <sup>144</sup>
Dec. 5.4	11.880 <sup>9</sup>	23.91 <sup>212</sup>	7.734 <sup>32</sup>	45.17 <sup>159</sup>	21.199 <sup>15</sup>	21.32 <sup>161</sup>	39.810 <sup>37</sup>	23.78 <sup>132</sup>
15.4	11.871 <sup>43</sup>	26.03 <sup>197</sup>	7.766 <sup>24</sup>	46.76 <sup>141</sup>	21.214 <sup>20</sup>	22.93 <sup>153</sup>	39.847 <sup>12</sup>	25.10 <sup>114</sup>
25.4	11.828 <sup>79</sup>	28.00 <sup>174</sup>	7.742 <sup>78</sup>	48.17 <sup>117</sup>	21.194 <sup>53</sup>	24.46 <sup>140</sup>	39.835 <sup>63</sup>	26.24 <sup>94</sup>
35.4	11.749	29.74	7.664	49.34	21.141	25.86	39.772	27.18
Mean Place	7.202	38.44	0.504	23.67	16.294	37.56	32.977	2.94
Sec $\delta$ , Tan $\delta$	1.078	-0.402	1.481	+1.092	1.016	-0.177	1.353	+0.910
$D\phi\alpha$ , $D\omega\alpha$	+0.05	+0.02	+0.08	-0.04	+0.06	+0.01	+0.08	-0.04
$D\phi\delta$ , $D\omega\delta$	+0.2	+0.8	+0.2	+0.8	+0.2	+0.8	+0.2	+0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	5 H. Camelop. Mag. 4.7			$\eta$ Tauri. (Alyone.) Mag. 3.0			$\tau^6$ Eridani. Mag. 4.3			$\gamma$ Eridani. Mag. 4.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	"	h	m	"	h	m	"	h	m	"
	3	41	+71 4	3	42	+23 50	3	43	-23 29	3	46	-36 26
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 0.4	39.24		59.46	35.042		68.07	18.568		37.64	22.981		66.35
10.4	38.93	31	61.43	34.983	59	68.08	18.475	93	39.34	22.852	129	68.33
20.3	38.53	40	62.97	34.889	94	67.99	18.349	126	40.75	22.687	165	69.92
30.3	38.05	48	64.02	34.762	127	67.78	18.197	152	41.82	22.493	194	71.08
Feb. 9.3	37.51	54	64.53	34.612	150	67.47	18.022	175	42.52	22.276	217	71.78
		57			167			187			230	
19.2	36.94		64.48	34.445		67.05	17.835		42.84	22.046		72.01
Mar. 1.2	36.36	58	63.90	34.273	172	66.53	17.644	191	42.80	21.811	235	71.78
11.2	35.81	55	62.80	34.107	166	65.94	17.457	187	42.38	21.582	229	71.09
21.2	35.32	49	61.24	33.955	152	65.30	17.285	172	41.60	21.370	212	69.95
31.1	34.90	42	59.28	33.830	125	64.64	17.136	149	40.47	21.183	187	68.42
		33			91			118			153	
Apr. 10.1	34.57		57.02	33.739		64.01	17.018		39.03	21.030		66.52
20.1	34.37	20	54.52	33.690	49	63.44	16.939	79	37.27	20.919	111	64.28
30.1	34.29	8	51.90	33.687	3	62.98	16.904	35	35.24	20.856	63	61.74
May 10.0	34.33	4	49.26	33.736	49	62.65	16.915	11	33.00	20.843	13	58.98
20.0	34.52	19	46.70	33.833	97	62.50	16.973	58	30.57	20.882	39	56.05
		30			146			103			92	
30.0	34.82		44.28	33.979		62.51	17.078		28.01	20.974		53.00
June 8.9	35.24	42	42.10	34.169	190	62.72	17.229	151	25.39	21.116	142	49.92
18.9	35.77	53	40.20	34.400	231	63.12	17.420	191	22.76	21.305	189	46.89
28.9	36.40	63	38.64	34.666	266	63.69	17.647	227	20.20	21.536	231	43.97
July 8.9	37.10	70	37.47	34.958	292	64.44	17.904	257	17.77	21.802	266	41.25
		75			314			280			295	
18.8	37.85		36.70	35.272		65.31	18.184		15.55	22.097		38.81
28.8	38.64	79	36.36	35.597	325	66.29	18.482	298	13.59	22.413	316	36.72
Aug. 7.8	39.47	83	36.44	35.929	332	67.35	18.789	307	11.97	22.742	329	35.04
17.8	40.30	83	36.93	36.261	332	68.44	19.097	308	10.74	23.076	334	33.84
27.7	41.13	83	37.84	36.587	326	69.55	19.401	304	9.93	23.408	332	33.14
		80			315			295			323	
Sept. 6.7	41.93		39.14	36.902		70.63	19.696		9.58	23.731		32.99
16.7	42.70	77	40.79	37.202	300	71.65	19.976	280	9.71	24.037	306	33.39
26.6	43.43	73	42.78	37.484	282	72.60	20.236	260	10.30	24.322	285	34.32
Oct. 6.6	44.09	66	45.04	37.744	260	73.47	20.473	237	11.34	24.580	258	35.77
16.6	44.69	60	47.57	37.981	237	74.24	20.682	209	12.77	24.805	225	37.65
		52			209			180			191	
26.6	45.21		50.28	38.190		74.90	20.862		14.55	24.996		39.93
Nov. 5.5	45.64	43	53.14	38.372	182	75.48	21.010	148	16.60	25.148	152	42.50
15.5	45.97	33	56.08	38.522	150	75.97	21.123	113	18.83	25.258	110	45.26
25.5	46.20	23	59.03	38.638	116	76.37	21.200	77	21.16	25.325	67	48.11
Dec. 5.5	46.30	10	61.92	38.717	79	76.69	21.239	39	23.50	25.348	23	50.95
		2			41			2			22	
15.4	46.28		64.66	38.758		76.92	21.241		25.77	25.326		53.67
25.4	46.15	13	67.17	38.760	2	77.07	21.204	37	27.88	25.260	66	56.18
35.4	45.91	24	69.35	38.722	38	77.13	21.130	74	29.77	25.154	106	58.39
Mean Place	34.461		40.54	32.843		57.71	16.595		36.69	20.924		62.88
Sec $\delta$ , Tan $\delta$	3.085		+2.918	1.093		+0.442	1.090		-0.435	1.243		-0.739
$D\delta\alpha$ , $D\omega\alpha$	+0.12		-0.11	+0.07		-0.02	+0.05		+0.02	+0.04		+0.03
$D\delta\delta$ , $D\omega\delta$	+0.2		+0.8	+0.2		+0.8	+0.2		+0.8	+0.2		+0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Hydri. Mag. 3.2			$\zeta$ Persei. Mag. 2.9			9 H. Camelop. Mag. 5.2			$\epsilon$ Persei. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	3	48	-74 29	3	48	+31 38	3	50	+60 51	3	52	+39 46
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 0.4	34.33		44.67 205	56.997		29.05 38	6.52		78.17 165	19.355		29.53 75
10.4	33.66	67	46.72 153	56.936	61	29.43 38	6.35	17	79.82 128	19.285	70	30.28 34
20.3	32.91	75	48.25 96	56.834	102	29.64 21	6.12	23	81.10 87	19.169	116	30.82 27
30.3	32.09	82	49.21 38	56.699	135	29.67 3	5.84	28	81.97 41	19.015	154	31.09 2
Feb. 9.3	31.22	87	49.59 20	56.536	163	29.51 16	5.51	33	82.38 6	18.831	184	31.11 26
		88			180			36			204	
19.2	30.34		49.39 76	56.356		29.17 53	5.15		82.32 52	18.627		30.85 52
Mar. 1.2	29.46	88	48.63 130	56.168	188	28.64 70	4.79	36	81.80 96	18.413	214	30.33 78
11.2	28.60	86	47.33 180	55.984	184	27.94 81	4.43	36	80.84 136	18.206	207	29.55 97
21.2	27.81	79	45.53 225	55.817	167	27.13 90	4.11	32	79.48 170	18.015	191	28.58 115
31.1	27.08	73	43.28 263	55.676	141	26.23 94	3.84	27	77.78 196	17.855	160	27.43 125
		63			103			21			120	
Apr. 10.1	26.45		40.65 297	55.573	59	25.29 94	3.63	13	75.82 215	17.735	72	26.18 131
20.1	25.92	53	37.68 323	55.514	10	24.35 88	3.50	5	73.67 223	17.663	17	24.87 129
30.1	25.52	40	34.45 342	55.504	43	23.47 78	3.45	3	71.44 224	17.646	40	23.58 123
May 10.0	25.24	28	31.03 354	55.547	98	22.69 63	3.48	13	69.20 216	17.686	101	22.35 110
20.0	25.11	0	27.49 356	55.645	149	22.06 47	3.61	21	67.04 203	17.787	157	21.25 94
30.0	25.11		23.93 350	55.794		21.59 26	3.82		65.01 181	17.944		20.31 74
June 8.9	25.25	14	20.43 337	55.991	197	21.33 6	4.13	31	63.20 154	18.154	210	19.57 53
18.9	25.54	29	17.06 313	56.232	241	21.27 15	4.50	37	61.66 124	18.412	258	19.04 27
28.9	25.95	41	13.93 283	56.509	277	21.42 35	4.93	43	60.42 91	18.711	299	18.77 4
July 8.9	26.47	52	11.10 243	56.817	308	21.77 54	5.41	48	59.51 54	19.043	332	18.73 20
		63			329			53			359	
18.8	27.10		8.67 196	57.146		22.31 72	5.94		58.97 18	19.402		18.93 42
28.8	27.80	70	6.71 143	57.491	345	23.03 84	6.49	55	58.79 18	19.778	376	19.35 65
Aug. 7.8	28.57	77	5.28 86	57.845	354	23.87 96	7.06	57	58.97 53	20.163	385	20.00 82
17.8	29.38	81	4.42 24	58.199	354	24.83 105	7.64	58	59.50 88	20.550	387	20.82 98
27.7	30.20	82	4.18 39	58.547	340	25.88 110	8.21	57	60.38 119	20.933	373	21.80 111
		81						56				
Sept. 6.7	31.01		4.57 101	58.887		26.98 112	8.77		61.57 147	21.306		22.91 122
16.7	31.79	78	5.58 160	59.211	324	28.10 113	9.31	54	63.04 174	21.663	357	24.13 130
26.6	32.50	71	7.18 216	59.516	305	29.23 111	9.82	51	64.78 196	22.002	339	25.43 136
Oct. 6.6	33.13	63	9.34 264	59.801	285	30.34 108	10.30	48	66.74 217	22.317	315	26.79 140
16.6	33.65	52	11.98 301	60.060	259	31.42 104	10.73	43	68.91 232	22.606	289	28.19 141
		38			232			38			258	
26.6	34.03		14.99 327	60.292		32.46 99	11.11		71.23 242	22.864		29.60 141
Nov. 5.5	34.28	25	18.26 343	60.493	201	33.45 93	11.42	31	73.65 248	23.088	224	31.01 139
15.5	34.39	11	21.69 345	60.661	168	34.38 87	11.68	26	76.13 248	23.272	188	32.40 135
25.5	34.33	6	25.14 335	60.792	131	35.25 79	11.87	19	78.61 243	23.422	146	33.75 127
Dec. 5.5	34.14	19	28.49 312	60.885	93	36.04 69	11.99	12	81.04 231	23.524	102	35.02 117
		34			49			4			54	
15.4	33.80		31.61 280	60.934		36.73 58	12.03		83.35 210	23.578		36.19 104
25.4	33.31	49	34.41 237	60.939	5	37.31 46	11.99	4	85.45 184	23.583	5	37.23 87
35.4	32.71	60	36.78	60.901	38	37.77	11.88	11	87.29	23.538	45	38.10
Mean Place	30.514		36.94	54.636		17.23	2.934		61.14	16.786		16.22
Sec $\delta$ , Tan $\delta$	3.740		-3.604	1.175		+0.616	2.054		+1.794	1.301		+0.832
$D_{\phi} a$ , $D_{\omega} a$	-0.02		+0.13	+0.07		-0.02	+0.10		-0.06	+0.08		-0.03
$D_{\phi} \delta$ , $D_{\omega} \delta$	+0.2		+0.8	+0.2		+0.8	+0.2		+0.8	+0.2		+0.8



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Persei. Mag. 4.0		γ Eridani. Mag. 3.2		λ Tauri. Var. 3.3-4.2		δ Reticuli. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 53 s	° ' " +35 33 "	h m 3 54 s	° ' " -13 44 "	h m 3 56 s	° ' " +12 15 "	h m 3 57 s	° ' " -61 37 "
Jan. 0.4	37.001	24.04 58	11.392	36.70 149	6.934	31.31 48	28.25 31	68.88 227
10.4	36.939	24.62 38	11.324	38.19 126	6.888	30.83 48	27.94 36	71.15 178
20.3	36.834	25.00 16	11.224	39.45 101	6.806	30.35 47	27.58 41	72.93 125
30.3	36.693	25.16 5	11.094	40.46 73	6.693	29.88 44	27.17 45	74.18 68
Feb. 9.3	36.521	25.11 29	10.941	41.19 44	6.555	29.44 43	26.72 46	74.86 11
19.3	36.331	24.82 50	10.772	41.63 14	6.400	29.01 39	26.26 47	74.97 46
Mar. 1.2	36.132	24.32 72	10.597	41.77 15	6.237	28.62 35	25.79 45	74.51 100
11.2	35.936	23.60 87	10.424	41.62 44	6.075	28.27 29	25.34 43	73.51 151
21.2	35.757	22.73 101	10.264	41.18 74	5.926	27.98 19	24.91 38	72.00 198
31.1	35.606	21.72 108	10.124	40.44 101	5.799	27.79 10	24.53 34	70.02 239
Apr. 10.1	35.493	20.64 111	10.014	39.43 128	5.701	27.69 2	24.19 27	67.63 277
20.1	35.425	19.53 108	9.940	38.15 33	5.642	27.71 17	23.92 21	64.86 307
30.1	35.409	18.45 100	9.907	36.61 175	5.625	27.88 33	23.71 13	61.79 329
May 10.0	35.448	17.45 87	9.919	34.86 193	5.654	28.21 49	23.58 5	58.50 344
20.0	35.544	16.58 70	9.976	32.93 210	5.730	28.70 67	23.53 4	55.06 353
30.0	35.693	15.88 52	10.079	30.83 220	5.852	29.37 82	23.57 12	51.53 351
June 8.9	35.892	15.36 29	10.225	28.63 224	6.016	30.19 96	23.69 20	48.02 342
18.9	36.138	15.07 9	10.409	26.39 224	6.220	31.15 108	23.89 27	44.60 324
28.9	36.422	14.98 15	10.629	24.15 216	6.457	32.23 117	24.16 33	41.36 296
July 8.9	36.738	15.13 35	10.878	21.99 208	6.722	33.40 121	24.49 39	38.40 260
18.8	37.078	15.48 54	11.148	19.96 185	7.007	34.61 123	24.88 44	35.80 217
28.8	37.436	16.02 72	11.434	18.11 158	7.306	35.84 118	25.32 47	33.63 167
Aug. 7.8	37.802	16.74 86	11.730	16.53 128	7.615	37.02 113	25.79 49	31.96 111
17.8	38.171	17.60 99	12.030	15.25 98	7.925	38.15 102	26.28 50	30.85 50
27.7	38.535	18.59 108	12.327	14.32 55	8.231	39.17 87	26.78 49	30.35 12
Sept. 6.7	38.889	19.67 114	12.615	13.77 14	8.529	40.04 70	27.27 47	30.47 75
16.7	39.230	20.81 120	12.891	13.63 26	8.815	40.74 53	27.74 44	31.22 137
26.6	39.552	22.01 121	13.150	13.89 65	9.086	41.27 35	28.18 39	32.59 193
Oct. 6.6	39.852	23.22 121	13.389	14.54 100	9.337	41.62 16	28.57 34	34.52 244
16.6	40.128	24.43 120	13.604	15.54 132	9.568	41.78 0	28.91 28	36.96 285
26.6	40.374	25.63 117	13.794	16.86 158	9.774	41.78 15	29.19 19	39.81 318
Nov. 5.5	40.589	26.80 114	13.955	18.44 176	9.954	41.63 28	29.38 12	42.99 337
15.5	40.769	27.94 109	14.085	20.20 187	10.105	41.35 37	29.50 4	46.36 344
25.5	40.911	29.03 102	14.182	22.07 192	10.225	40.98 43	29.54 4	49.80 340
Dec. 5.5	41.011	30.05 93	14.244	23.99 188	10.310	40.55 47	29.50 12	53.20 323
15.4	41.066	30.98 81	14.269	25.87 178	10.360	40.08 50	29.38 20	56.43 294
25.4	41.075	31.79 65	14.258	27.65 162	10.371	39.58 50	29.18 26	59.37 256
35.4	41.037	32.44	14.210	29.27	10.344	39.08	28.92	61.93
Mean Place	34.530	11.66	9.390	37.92	4.802	24.18	25.568	62.37
Sec δ, Tan δ	1.229	+0.715	1.029	-0.245	1.023	+0.217	2.105	-1.852
Dψ α, Dα α	+0.08	-0.03	+0.06	+0.01	+0.07	-0.01	+0.02	+0.06
ψ δ, Dα δ	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Tauri. Mag. 3.9		$\alpha$ Tauri. Mag. 4.5		$\epsilon$ Persei. Mag. 4.0		$\delta$ Tauri. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 3 58 s	° ' " + 5 45 "	h m 3 59 s	° ' " +21 51 "	h m 4 2 s	° ' " +47 29 "	h m 4 5 s	° ' " +26 15 "
Jan. 0.4	46.472	41.07	49.395	31.11	40.744	45.44	48.730	64.88
10.4	46.426	40.31	49.351	31.06	40.666	46.59	48.688	65.05
20.3	46.344	39.61	49.268	30.93	40.535	47.49	48.605	65.11
30.3	46.232	38.99	49.151	30.73	40.359	48.07	48.486	65.06
Feb. 9.3	46.096	38.45	49.008	30.45	40.144	48.33	48.339	64.90
19.3	45.942	38.00	48.845	30.09	39.906	48.24	48.170	64.60
Mar. 1.2	45.780	37.65	48.674	29.66	39.657	47.82	47.991	64.18
11.2	45.619	37.43	48.504	29.17	39.411	47.06	47.813	63.66
21.2	45.469	37.32	48.348	28.65	39.182	46.02	47.648	63.06
31.1	45.341	37.34	48.212	28.12	38.986	44.73	47.504	62.41
Apr. 10.1	45.241	37.53	48.109	27.61	38.834	43.26	47.393	61.74
20.1	45.179	37.87	48.046	27.17	38.736	41.68	47.322	61.10
30.1	45.157	38.39	48.028	26.81	38.698	40.04	47.297	60.51
May 10.0	45.180	39.09	48.057	26.59	38.725	38.42	47.321	60.02
20.0	45.249	39.95	48.135	26.50	38.819	36.88	47.396	59.66
30.0	45.363	40.98	48.262	26.57	38.975	35.47	47.520	59.47
June 9.0	45.519	42.17	48.434	26.83	39.193	34.26	47.693	59.43
18.9	45.714	43.46	48.647	27.24	39.466	33.26	47.907	59.57
28.9	45.941	44.84	48.896	27.81	39.787	32.52	48.159	59.88
July 8.9	46.197	46.27	49.173	28.53	40.148	32.04	48.440	60.35
18.8	46.473	47.71	49.473	29.35	40.540	31.85	48.747	60.97
28.8	46.765	49.10	49.788	30.27	40.954	31.92	49.070	61.71
Aug. 7.8	47.065	50.41	50.112	31.25	41.381	32.25	49.402	62.54
17.8	47.367	51.57	50.439	32.24	41.814	32.83	49.739	63.43
27.7	47.667	52.58	50.763	33.22	42.245	33.65	50.074	64.35
Sept. 6.7	47.959	53.37	51.079	34.16	42.667	34.66	50.402	65.26
16.7	48.239	53.94	51.382	35.03	43.076	35.87	50.718	66.16
26.7	48.503	54.26	51.670	35.81	43.464	37.22	51.018	67.02
Oct. 6.6	48.750	54.35	51.939	36.49	43.827	38.70	51.301	67.82
16.6	48.976	54.20	52.186	37.07	44.163	40.30	51.561	68.54
26.6	49.178	53.85	52.408	37.55	44.465	41.98	51.798	69.21
Nov. 5.5	49.354	53.33	52.604	37.94	44.730	43.71	52.007	69.81
15.5	49.503	52.65	52.769	38.23	44.952	45.47	52.183	70.34
25.5	49.620	51.87	52.902	38.44	45.126	47.22	52.327	70.82
Dec. 5.5	49.703	51.04	52.999	38.60	45.249	48.92	52.433	71.23
15.4	49.751	50.18	53.057	38.69	45.317	50.53	52.499	71.58
25.4	49.761	49.33	53.074	38.72	45.327	52.00	52.522	71.87
35.4	49.734	48.53	53.051	38.70	45.279	53.29	52.503	72.07
Mean Place	44.381	35.51	47.139	21.96	37.844	31.39	46.378	55.08
Sec $\delta$ , Tan $\delta$	1.005	+0.101	1.077	+0.401	1.480	+1.091	1.115	+0.494
$D\psi\alpha$ , $D\omega\alpha$	+0.06	0.00	+0.07	-0.01	+0.09	-0.04	+0.07	-0.02
$D\psi\delta$ , $D\omega\delta$	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha^1$ Eridani. Mag. 4.1		$\mu$ Tauri. Mag. 4.3		$\alpha$ Horologii. Mag. 3.8		$\alpha$ Reticuli. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 7 s	° ' " - 7 2 "	h m 4 11 s	° ' " + 8 41 "	h m 4 11 s	° ' " -42 29 "	h m 4 13 s	° ' " -62 40 "
Jan. 0.4	50.851	68.69	3.707	13.26	17.286	59.52	23.87	58.91
10.4	50.801	70.00	3.667	12.60	17.150	61.84	23.57	61.38
20.3	50.715	71.13	3.594	11.99	16.972	63.75	23.20	63.36
30.3	50.598	72.07	3.488	11.43	16.757	65.21	22.79	64.83
Feb. 9.3	50.457	72.79	3.355	10.93	16.514	66.19	22.33	65.73
19.3	50.296	73.29	3.202	10.51	16.251	66.66	21.85	66.07
Mar. 1.2	50.127	73.55	3.038	10.16	15.980	66.63	21.36	65.84
11.2	49.958	73.58	2.875	9.88	15.711	66.11	20.88	65.06
21.2	49.799	73.36	2.721	9.71	15.455	65.11	20.42	63.76
31.2	49.658	72.91	2.585	9.64	15.222	63.66	19.99	61.97
Apr. 10.1	49.546	72.21	2.478	9.69	15.023	61.82	19.61	59.75
20.1	49.468	71.28	2.406	9.89	14.865	59.59	19.29	57.14
30.1	49.430	70.11	2.375	10.23	14.755	57.03	19.06	54.19
May 10.0	49.435	68.75	2.388	10.73	14.697	54.22	18.89	51.00
20.0	49.485	67.19	2.447	11.40	14.696	51.20	18.80	47.62
30.0	49.579	65.47	2.552	12.22	14.750	48.05	18.80	44.13
June 9.0	49.717	63.63	2.699	13.19	14.859	44.85	18.88	40.62
18.9	49.894	61.72	2.885	14.28	15.020	41.66	19.05	37.17
28.9	50.106	59.77	3.107	15.48	15.230	38.59	19.30	33.87
July 8.9	50.346	57.84	3.358	16.74	15.482	35.70	19.62	30.83
18.9	50.610	56.00	3.631	18.01	15.769	33.08	20.00	28.11
28.8	50.890	54.30	3.920	19.27	16.085	30.81	20.42	25.80
Aug. 7.8	51.181	52.79	4.219	20.46	16.421	28.97	20.89	23.98
17.8	51.477	51.53	4.524	21.56	16.770	27.61	21.39	22.71
27.7	51.771	50.55	4.827	22.52	17.123	26.79	21.90	22.04
Sept. 6.7	52.060	49.91	5.124	23.30	17.471	26.54	22.41	22.00
16.7	52.339	49.61	5.411	23.89	17.808	26.87	22.90	22.59
26.7	52.602	49.65	5.685	24.26	18.127	27.79	23.37	23.80
Oct. 6.6	52.849	50.05	5.941	24.41	18.421	29.25	23.80	25.60
16.6	53.076	50.77	6.179	24.36	18.684	31.21	24.17	27.94
26.6	53.278	51.77	6.393	24.11	18.909	33.60	24.47	30.73
Nov. 5.6	53.454	53.03	6.584	23.70	19.095	36.34	24.71	33.87
15.5	53.602	54.45	6.745	23.16	19.235	39.33	24.86	37.23
25.5	53.717	56.00	6.876	22.53	19.326	42.44	24.94	40.73
Dec. 5.5	53.798	57.60	6.974	21.83	19.368	45.57	24.93	44.19
15.4	53.844	59.19	7.035	21.11	19.358	48.59	24.83	47.52
25.4	53.852	60.72	7.058	20.38	19.298	51.43	24.65	50.60
35.4	53.821	62.14	7.042	19.67	19.189	53.98	24.37	53.34
Mean Place	48.789	71.25	1.544	7.40	15.072	55.70	21.071	53.00
Sec $\delta$ , Tan $\delta$	1.008	-0.124	1.012	+0.153	1.356	-0.916	2.179	-1.936
$D_\psi \alpha$ , $D_\omega \alpha$	+0.06	0.00	+0.06	0.00	+0.04	+0.03	+0.02	+0.06
$D_\psi \delta$ , $D_\omega \delta$	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Tauri. Mag. 3.9		$\delta$ Tauri. Mag. 3.9		$\nu^5$ Eridani. Mag. 4.1		$\delta$ Mensæ. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 15	° ' " +15 25	h m 4 18	° ' " +17 20	h m 4 20	° ' " -34 12	h m 4 23	° ' " -80 24
	s	"	s	"	s	"	s	"
Jan. 0.4	6.319	48.46	11.035	63.11	57.291	34.94	38.89	39.97
10.4	6.287 32	48.11 35	11.005 30	62.86 25	57.197 94	37.19 225	37.87 102	42.38 241
20.3	6.216 71	47.76 35	10.935 70	62.59 27	57.062 135	39.08 189	36.67 120	44.32 194
30.3	6.111 105	47.40 36	10.830 105	62.30 29	56.890 172	40.57 149	35.35 132	45.74 142
Feb. 9.3	5.977 134	47.04 36	10.696 134	61.99 31	56.689 201	41.62 105	33.93 142	46.60 86
	155	37	156	34	220	60	147	31
19.3	5.822	46.67	10.540	61.65	56.469	42.22	32.46	46.91
Mar. 1.2	5.656 166	46.31 36	10.371 169	61.29 36	56.237 232	42.37 15	30.96 150	46.67 24
11.2	5.488 168	45.95 36	10.201 170	60.92 37	56.005 232	42.07 30	29.49 147	45.86 81
21.2	5.330 158	45.62 33	10.040 161	60.55 37	55.782 223	41.32 75	28.06 143	44.55 131
31.2	5.190 140	45.34 28	9.898 142	60.21 34	55.579 203	40.16 116	26.73 133	42.78 177
	110	21	113	29	175	156	120	222
Apr. 10.1	5.080 74	45.13 13	9.785 77	59.92 21	55.404 137	38.60 191	25.53 105	40.56 258
20.1	5.006 33	45.00 1	9.708 35	59.71 12	55.267 95	36.69 223	24.48 88	37.98 287
30.1	4.973 12	44.99 11	9.673 11	59.59 1	55.172 46	34.46 251	23.60 09	35.11 315
May 10.0	4.985 60	45.10 27	9.684 58	59.60 14	55.126 4	31.95 271	22.91 49	31.96 331
20.0	5.045 106	45.37 41	9.742 105	59.74 30	55.130 54	29.24 286	22.42 27	28.65 340
30.0	5.151 151	45.78 57	9.847 150	60.04 44	55.184 104	26.38 296	22.15 2	25.25 342
June 9.0	5.302 192	46.35 71	9.997 190	60.48 59	55.288 152	23.42 297	22.13 19	21.83 336
18.9	5.494 227	47.06 82	10.187 227	61.07 72	55.440 195	20.45 291	22.32 40	18.47 319
28.9	5.721 257	47.88 93	10.414 258	61.79 82	55.635 232	17.54 277	22.72 61	15.28 299
July 8.9	5.978 279	48.81 100	10.672 280	62.61 90	55.867 266	14.77 253	23.33 80	12.29 260
18.9	6.257 297	49.81 102	10.952 299	63.51 95	56.133 290	12.24 224	24.13 95	9.69 221
28.8	6.554 309	50.83 103	11.251 310	64.46 96	56.423 310	10.00 188	25.08 110	7.48 174
Aug. 7.8	6.863 312	51.86 99	11.561 315	65.42 94	56.733 321	8.12 143	26.18 120	5.74 119
17.8	7.175 312	52.85 91	11.876 315	66.36 88	57.064 325	6.69 94	27.38 125	4.55 62
27.7	7.487 305	53.76 81	12.191 310	67.24 80	57.379 323	5.75 42	28.63 128	3.93 1
Sept. 6.7	7.792 298	54.57 66	12.501 300	68.04 67	57.702 313	5.33 12	29.91 125	3.94 63
16.7	8.090 284	55.23 52	12.801 299	68.71 55	58.015 299	5.45 66	31.16 119	4.57 125
26.7	8.374 267	55.75 38	13.090 273	69.26 42	58.314 279	6.11 119	32.35 108	5.82 182
Oct. 6.6	8.641 248	56.13 21	13.363 253	69.68 27	58.593 253	7.30 168	33.43 94	7.64 236
16.6	8.889 227	56.34 8	13.616 232	69.95 16	58.846 222	8.98 210	34.37 75	10.00 278
26.6	9.116 201	56.42 6	13.848 207	70.11 4	59.068 190	11.08 245	35.12 54	12.78 314
Nov. 5.6	9.317 173	56.36 14	14.055 179	70.15 5	59.258 151	13.53 270	35.66 30	15.92 336
15.5	9.490 142	56.22 25	14.234 147	70.10 12	59.409 110	16.23 284	35.96 6	19.28 345
25.5	9.632 107	55.97 29	14.381 113	69.98 18	59.519 66	19.07 290	36.02 20	22.73 346
Dec. 5.5	9.739 70	55.68 32	14.494 74	69.80 21	59.585 21	21.97 284	35.82 44	26.19 329
15.4	9.809 30	55.36 35	14.568 33	69.59 25	59.606 25	24.81 269	35.38 69	29.48 306
25.4	9.839 10	55.01 36	14.601 7	69.34 26	59.581 71	27.50 244	34.69 90	32.54 271
35.4	9.829	54.65	14.594	69.08	59.510	29.94	33.79	35.25
Mean Place	4.077	41.32	8.755	55.71	55.139	32.57	32.981	33.81
Sec $\delta$ , Tan $\delta$	1.037	+0.276	1.048	+0.312	1.209	-0.680	6.001	-5.917
$D\psi a$ , $D_{\omega} a$	+0.07	-0.01	+0.07	-0.01	+0.04	+0.02	-0.08	+0.16
$D\psi \delta$ , $D_{\omega} \delta$	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Tauri. Mag. 3.6		m Persei. Mag. 6.1		α Tauri. (Aldebaran.) Mag. 1.1		ν Eridani. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 23	° ' " +18 59	h m 4 27	° ' " +42 53	h m 4 31	° ' " +16 20	h m 4 32	° ' " - 3 30
	s	"	s	"	s	"	s	"
Jan. 0.4	48.409	57.91	37.138	27.48	11.674	42.95	12.385	73.50
10.4	48.383	57.74	37.099	28.52	11.655	42.65	12.355	74.76
20.4	48.317	57.55	37.006	29.38	11.594	42.34	12.287	75.86
30.3	48.214	57.31	36.865	29.99	11.497	42.03	12.186	76.80
Feb. 9.3	48.081	57.05	36.684	30.34	11.367	41.71	12.054	77.55
19.3	47.925	56.75	36.474	30.42	11.215	41.39	11.900	78.11
Mar. 1.2	47.754	56.40	36.248	30.20	11.046	41.06	11.731	78.47
11.2	47.581	56.03	36.018	29.71	10.874	40.73	11.560	78.61
21.2	47.417	55.65	35.799	28.94	10.710	40.41	11.395	78.55
31.2	47.271	55.28	35.603	27.96	10.561	40.12	11.244	78.27
Apr. 10.1	47.153	54.93	35.443	26.79	10.440	39.90	11.119	77.79
20.1	47.071	54.64	35.329	25.51	10.353	39.73	11.025	77.08
30.1	47.031	54.45	35.268	24.16	10.306	39.66	10.969	76.18
May 10.1	47.037	54.36	35.267	22.79	10.305	39.70	10.956	75.07
20.0	47.090	54.40	35.325	21.47	10.350	39.88	10.987	73.78
30.0	47.191	54.58	35.443	20.26	10.441	40.20	11.063	72.33
June 9.0	47.338	54.91	35.618	19.18	10.578	40.65	11.181	70.75
18.9	47.525	55.37	35.846	18.28	10.756	41.23	11.339	69.06
28.9	47.750	55.97	36.122	17.58	10.971	41.94	11.532	67.34
July 8.9	48.006	56.69	36.438	17.09	11.217	42.74	11.757	65.61
18.9	48.286	57.49	36.786	16.83	11.488	43.61	12.008	63.94
28.8	48.586	58.35	37.159	16.79	11.778	44.51	12.277	62.37
Aug. 7.8	48.896	59.23	37.549	16.97	12.082	45.42	12.560	60.95
17.8	49.213	60.10	37.949	17.34	12.392	46.29	12.851	59.74
27.8	49.531	60.94	38.351	17.89	12.705	47.10	13.144	58.78
Sept. 6.7	49.845	61.70	38.748	18.62	13.015	47.80	13.436	58.12
16.7	50.150	62.36	39.138	19.49	13.317	48.39	13.721	57.77
26.7	50.444	62.91	39.515	20.48	13.609	48.84	13.994	57.74
Oct. 6.6	50.723	63.35	39.872	21.58	13.887	49.15	14.254	58.04
16.6	50.983	63.67	40.208	22.77	14.148	49.31	14.498	58.65
26.6	51.222	63.87	40.517	24.03	14.389	49.34	14.722	59.53
Nov. 5.6	51.436	63.97	40.794	25.36	14.606	49.26	14.921	60.65
15.5	51.624	63.99	41.034	26.72	14.791	49.09	15.093	61.94
25.5	51.778	63.95	41.232	28.10	14.956	48.85	15.236	63.36
Dec. 5.5	51.897	63.86	41.383	29.47	15.080	48.56	15.344	64.84
15.5	51.978	63.74	41.483	30.80	15.166	48.25	15.415	66.33
25.4	52.018	63.59	41.528	32.05	15.213	47.93	15.447	67.78
35.4	52.015	63.42	41.519	33.17	15.216	47.61	15.440	69.12
Mean Place	46.086	50.43	34.256	15.99	9.358	36.31	10.231	76.42
Sec δ, Tan δ	1.058	+0.344	1.365	+0.929	1.042	+0.293	1.002	-0.061
D <sub>δ</sub> α, D <sub>α</sub> α	+0.07	-0.01	+0.08	-0.02	+0.07	-0.01	+0.06	0.00
D <sub>δ</sub> δ, D <sub>α</sub> δ	+0.2	+0.9	+0.2	+0.9	+0.2	+0.9	+0.1	+0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Doradus. Mag. 3.5		53 Eridani. Mag. 4.0		$\tau$ Tauri. Mag. 4.3		Groombridge 848. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 32	° ' " -55 12	h m 4 34	° ' " -14 27	h m 4 37	° ' " +22 47	h m 4 37	° ' " +75 47
	s	"	s	"	s	"	s	"
Jan. 0.4	14.670	63.39	24.776	54.47	18.124	62.86	45.55	46.56
10.4	14.475 <sup>195</sup>	66.05 <sup>266</sup>	24.736 <sup>40</sup>	56.19 <sup>172</sup>	18.110 <sup>14</sup>	62.89 <sup>3</sup>	45.29 <sup>26</sup>	49.08 <sup>252</sup>
20.4	14.223 <sup>252</sup>	68.27 <sup>222</sup>	24.656 <sup>80</sup>	57.69 <sup>150</sup>	18.051 <sup>59</sup>	62.88 <sup>1</sup>	44.88 <sup>41</sup>	51.26 <sup>218</sup>
30.3	13.922 <sup>301</sup>	70.01 <sup>174</sup>	24.541 <sup>115</sup>	58.93 <sup>124</sup>	17.954 <sup>97</sup>	62.81 <sup>7</sup>	44.33 <sup>55</sup>	53.03 <sup>177</sup>
Feb. 9.3	13.583 <sup>339</sup>	71.24 <sup>123</sup>	24.397 <sup>144</sup>	59.90 <sup>97</sup>	17.822 <sup>132</sup>	62.68 <sup>13</sup>	43.68 <sup>65</sup>	54.31 <sup>128</sup>
	366	67	167	66	159	21	75	75
19.3	13.217	71.91	24.230	60.56	17.663	62.47	42.93	55.06
Mar. 1.3	12.836 <sup>381</sup>	72.04 <sup>13</sup>	24.050 <sup>180</sup>	60.92 <sup>36</sup>	17.489 <sup>174</sup>	62.20 <sup>27</sup>	42.15 <sup>78</sup>	55.24 <sup>18</sup>
11.2	12.454 <sup>382</sup>	71.63 <sup>41</sup>	23.865 <sup>185</sup>	60.97 <sup>5</sup>	17.310 <sup>179</sup>	61.86 <sup>34</sup>	41.36 <sup>79</sup>	54.86 <sup>38</sup>
21.2	12.084 <sup>370</sup>	70.68 <sup>95</sup>	23.687 <sup>178</sup>	60.71 <sup>26</sup>	17.136 <sup>174</sup>	61.46 <sup>40</sup>	40.60 <sup>76</sup>	53.94 <sup>92</sup>
31.2	11.740 <sup>344</sup>	69.24 <sup>144</sup>	23.524 <sup>163</sup>	60.16 <sup>55</sup>	16.980 <sup>156</sup>	61.02 <sup>44</sup>	39.92 <sup>68</sup>	52.50 <sup>144</sup>
	307	188	140	85	130	45	60	185
Apr. 10.1	11.433	67.36	23.384	59.31	16.850	60.57	39.32	50.65
20.1	11.172 <sup>261</sup>	65.05 <sup>231</sup>	23.278 <sup>106</sup>	58.18 <sup>113</sup>	16.755 <sup>95</sup>	60.14 <sup>43</sup>	38.85 <sup>47</sup>	48.42 <sup>223</sup>
30.1	10.967 <sup>205</sup>	62.39 <sup>266</sup>	23.210 <sup>68</sup>	56.79 <sup>139</sup>	16.703 <sup>6</sup>	59.75 <sup>39</sup>	38.53 <sup>32</sup>	45.92 <sup>250</sup>
May 10.1	10.826 <sup>141</sup>	59.43 <sup>296</sup>	23.183 <sup>27</sup>	55.16 <sup>163</sup>	16.697 <sup>52</sup>	59.45 <sup>30</sup>	38.37 <sup>16</sup>	43.26 <sup>266</sup>
20.0	10.751 <sup>75</sup>	56.25 <sup>318</sup>	23.201 <sup>18</sup>	53.33 <sup>183</sup>	16.739 <sup>42</sup>	59.26 <sup>19</sup>	38.37 <sup>0</sup>	40.50 <sup>276</sup>
	5	334	64	199	90	9	18	275
30.0	10.746	52.91	23.265	51.34	16.829	59.17	38.55	37.75
June 9.0	10.809 <sup>63</sup>	49.50 <sup>341</sup>	23.372 <sup>107</sup>	49.21 <sup>213</sup>	16.966 <sup>137</sup>	59.23 <sup>6</sup>	38.88 <sup>33</sup>	35.09 <sup>266</sup>
19.0	10.941 <sup>132</sup>	46.10 <sup>340</sup>	23.520 <sup>148</sup>	47.00 <sup>221</sup>	17.147 <sup>181</sup>	59.43 <sup>20</sup>	39.36 <sup>48</sup>	32.60 <sup>249</sup>
28.9	11.138 <sup>197</sup>	42.80 <sup>330</sup>	23.705 <sup>185</sup>	44.79 <sup>221</sup>	17.366 <sup>219</sup>	59.75 <sup>32</sup>	39.99 <sup>63</sup>	30.34 <sup>226</sup>
July 8.9	11.392 <sup>254</sup>	39.70 <sup>310</sup>	23.923 <sup>218</sup>	42.62 <sup>217</sup>	17.618 <sup>252</sup>	60.19 <sup>44</sup>	40.75 <sup>76</sup>	28.37 <sup>197</sup>
	306	284	244	205	278	55	86	162
18.9	11.698	36.86	24.167	40.57	17.896	60.74	41.61	26.75
Aug. 28.8	12.049 <sup>351</sup>	34.40 <sup>246</sup>	24.434 <sup>267</sup>	38.69 <sup>188</sup>	18.196 <sup>300</sup>	61.37 <sup>63</sup>	42.55 <sup>94</sup>	25.50 <sup>125</sup>
7.8	12.433 <sup>384</sup>	32.38 <sup>202</sup>	24.716 <sup>281</sup>	37.06 <sup>163</sup>	18.509 <sup>313</sup>	62.06 <sup>69</sup>	43.56 <sup>101</sup>	24.64 <sup>86</sup>
17.8	12.842 <sup>409</sup>	30.88 <sup>150</sup>	25.006 <sup>291</sup>	35.70 <sup>136</sup>	18.830 <sup>321</sup>	62.76 <sup>70</sup>	44.62 <sup>106</sup>	24.19 <sup>45</sup>
27.8	13.266 <sup>424</sup>	29.95 <sup>93</sup>	25.301 <sup>295</sup>	34.70 <sup>100</sup>	19.155 <sup>325</sup>	63.46 <sup>70</sup>	45.71 <sup>109</sup>	24.16 <sup>3</sup>
	427	33	293	61	323	67	109	39
Sept. 6.7	13.693	29.62	25.594	34.09	19.478	64.13	46.80	24.55
16.7	14.114 <sup>421</sup>	29.91 <sup>29</sup>	25.882 <sup>288</sup>	33.88 <sup>21</sup>	19.795 <sup>317</sup>	64.75 <sup>62</sup>	47.88 <sup>108</sup>	25.35 <sup>80</sup>
26.7	14.516 <sup>402</sup>	30.85 <sup>94</sup>	26.158 <sup>276</sup>	34.09 <sup>21</sup>	20.101 <sup>306</sup>	65.29 <sup>54</sup>	48.94 <sup>106</sup>	26.55 <sup>120</sup>
Oct. 6.7	14.891 <sup>375</sup>	32.38 <sup>153</sup>	26.419 <sup>261</sup>	34.72 <sup>63</sup>	20.395 <sup>294</sup>	65.76 <sup>47</sup>	49.94 <sup>100</sup>	28.12 <sup>157</sup>
16.6	15.228 <sup>337</sup>	34.46 <sup>208</sup>	26.664 <sup>245</sup>	35.73 <sup>101</sup>	20.672 <sup>277</sup>	66.14 <sup>38</sup>	50.88 <sup>94</sup>	30.03 <sup>191</sup>
	292	257	223	134	256	30	85	223
26.6	15.520	37.03	26.887	37.07	20.928	66.44	51.73	32.26
Nov. 5.6	15.757 <sup>237</sup>	40.00 <sup>297</sup>	27.084 <sup>197</sup>	38.72 <sup>165</sup>	21.161 <sup>233</sup>	66.67 <sup>23</sup>	52.47 <sup>74</sup>	34.76 <sup>250</sup>
15.5	15.936 <sup>179</sup>	43.24 <sup>324</sup>	27.262 <sup>168</sup>	40.59 <sup>187</sup>	21.366 <sup>205</sup>	66.85 <sup>18</sup>	53.11 <sup>64</sup>	37.48 <sup>272</sup>
25.5	16.050 <sup>114</sup>	46.65 <sup>341</sup>	27.389 <sup>137</sup>	42.60 <sup>201</sup>	21.539 <sup>201</sup>	66.99 <sup>14</sup>	53.60 <sup>49</sup>	40.35 <sup>287</sup>
Dec. 5.5	16.096 <sup>46</sup>	50.11 <sup>346</sup>	27.490 <sup>101</sup>	44.68 <sup>208</sup>	21.677 <sup>138</sup>	67.09 <sup>10</sup>	53.94 <sup>34</sup>	43.30 <sup>295</sup>
	23	338	63	208	97	9	17	295
15.5	16.073	53.49	27.553	46.76	21.774	67.18	54.11	46.25
25.4	15.980 <sup>93</sup>	56.69 <sup>320</sup>	27.575 <sup>22</sup>	48.76 <sup>200</sup>	21.828 <sup>54</sup>	67.24 <sup>6</sup>	54.12 <sup>1</sup>	49.11 <sup>286</sup>
35.4	15.822 <sup>158</sup>	59.58 <sup>289</sup>	27.556 <sup>19</sup>	50.62 <sup>180</sup>	21.838 <sup>10</sup>	67.27 <sup>3</sup>	53.97 <sup>15</sup>	51.79 <sup>268</sup>
Mean Place	12.109	58.87	22.647	55.42	15.692	55.34	38.363	32.16
Sec $\delta$ , Tan $\delta$	1.753	-1.440	1.033	-0.258	1.085	+0.420	4.075	+3.951
$D\phi\alpha$ , $D\omega\alpha$	+0.03	+0.03	+0.06	+0.01	+0.07	-0.01	+0.16	-0.09
$D\phi\delta$ , $D\omega\delta$	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Caeli. Mag. 4.5		4 Camelop. Mag. 5.4		$\mu$ Eridani. Mag. 4.2		$\pi^3$ Orionis. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 37	° ' " —42 0	h m 4 41	° ' " +56 36	h m 4 41	° ' " — 3 24	h m 4 45	° ' " + 6 49
	s		s		s		s	
Jan. 0.4	55.410	82.29	8.713	52.63	23.270	18.33	22.242	7.15
10.4	55.301 <sup>109</sup>	84.84 <sup>255</sup>	8.655 <sup>58</sup>	54.39 <sup>176</sup>	23.249 <sup>21</sup>	19.61 <sup>128</sup>	22.232 <sup>10</sup>	6.35 <sup>80</sup>
20.4	55.144 <sup>157</sup>	87.02 <sup>218</sup>	8.525 <sup>130</sup>	55.89 <sup>150</sup>	23.187 <sup>62</sup>	20.75 <sup>114</sup>	22.182 <sup>50</sup>	5.63 <sup>72</sup>
30.3	54.946 <sup>198</sup>	88.77 <sup>175</sup>	8.329 <sup>196</sup>	57.08 <sup>119</sup>	23.090 <sup>97</sup>	21.72 <sup>97</sup>	22.093 <sup>89</sup>	5.00 <sup>53</sup>
Feb. 9.3	54.715 <sup>231</sup>	90.05 <sup>128</sup>	8.079 <sup>250</sup>	57.92 <sup>84</sup>	22.962 <sup>128</sup>	22.48 <sup>76</sup>	21.972 <sup>121</sup>	4.45 <sup>65</sup>
19.3	54.458 <sup>257</sup>	90.84 <sup>79</sup>	7.787 <sup>292</sup>	58.36 <sup>44</sup>	22.810 <sup>152</sup>	23.07 <sup>59</sup>	21.826 <sup>146</sup>	4.01 <sup>44</sup>
Mar. 1.3	54.187 <sup>271</sup>	91.13 <sup>29</sup>	7.471 <sup>316</sup>	58.40 <sup>4</sup>	22.642 <sup>168</sup>	23.44 <sup>37</sup>	21.663 <sup>163</sup>	3.67 <sup>34</sup>
11.2	53.912 <sup>275</sup>	90.92 <sup>21</sup>	7.147 <sup>324</sup>	58.01 <sup>39</sup>	22.470 <sup>172</sup>	23.61 <sup>17</sup>	21.495 <sup>168</sup>	3.43 <sup>24</sup>
21.2	53.645 <sup>267</sup>	90.23 <sup>69</sup>	6.836 <sup>311</sup>	57.23 <sup>78</sup>	22.303 <sup>167</sup>	23.58 <sup>3</sup>	21.331 <sup>164</sup>	3.30 <sup>13</sup>
31.2	53.397 <sup>248</sup>	89.08 <sup>115</sup>	6.561 <sup>285</sup>	56.08 <sup>115</sup>	22.149 <sup>154</sup>	23.32 <sup>26</sup>	21.179 <sup>152</sup>	3.29 <sup>1</sup>
	221	159	240	145	131	45	127	10
Apr. 10.1	53.176 <sup>183</sup>	87.49 <sup>197</sup>	6.311 <sup>182</sup>	54.63 <sup>170</sup>	22.018 <sup>101</sup>	22.87 <sup>68</sup>	21.052 <sup>97</sup>	3.39 <sup>26</sup>
20.1	52.993 <sup>138</sup>	85.52 <sup>232</sup>	6.129 <sup>115</sup>	52.93 <sup>187</sup>	21.917 <sup>62</sup>	22.19 <sup>87</sup>	20.955 <sup>59</sup>	3.65 <sup>39</sup>
30.1	52.855 <sup>88</sup>	83.20 <sup>263</sup>	6.014 <sup>41</sup>	51.06 <sup>197</sup>	21.855 <sup>22</sup>	21.32 <sup>107</sup>	20.896 <sup>17</sup>	4.04 <sup>54</sup>
May 10.1	52.767 <sup>35</sup>	80.57 <sup>297</sup>	5.973 <sup>38</sup>	49.09 <sup>200</sup>	21.833 <sup>22</sup>	20.25 <sup>126</sup>	20.879 <sup>27</sup>	4.58 <sup>70</sup>
20.0	52.732 <sup>21</sup>	77.70 <sup>305</sup>	6.011 <sup>115</sup>	47.09 <sup>196</sup>	21.855 <sup>68</sup>	18.99 <sup>141</sup>	20.906 <sup>72</sup>	5.28 <sup>83</sup>
30.0	52.753 <sup>76</sup>	74.65 <sup>313</sup>	6.126 <sup>191</sup>	45.13 <sup>185</sup>	21.923 <sup>110</sup>	17.58 <sup>154</sup>	20.978 <sup>115</sup>	6.11 <sup>97</sup>
June 9.0	52.829 <sup>129</sup>	71.52 <sup>316</sup>	6.317 <sup>260</sup>	43.28 <sup>169</sup>	22.033 <sup>150</sup>	16.04 <sup>165</sup>	21.093 <sup>156</sup>	7.08 <sup>107</sup>
19.0	52.958 <sup>178</sup>	68.36 <sup>311</sup>	6.577 <sup>326</sup>	41.59 <sup>149</sup>	22.183 <sup>186</sup>	14.39 <sup>170</sup>	21.249 <sup>192</sup>	8.15 <sup>117</sup>
28.9	53.136 <sup>222</sup>	65.25 <sup>295</sup>	6.903 <sup>426</sup>	40.10 <sup>98</sup>	22.369 <sup>218</sup>	12.69 <sup>171</sup>	21.441 <sup>225</sup>	9.32 <sup>120</sup>
July 8.9	53.358 <sup>262</sup>	62.30 <sup>273</sup>	7.283 <sup>426</sup>	38.86 <sup>98</sup>	22.587 <sup>244</sup>	10.98 <sup>164</sup>	21.666 <sup>250</sup>	10.52 <sup>122</sup>
18.9	53.620 <sup>294</sup>	59.57 <sup>241</sup>	7.709 <sup>462</sup>	37.88 <sup>68</sup>	22.831 <sup>265</sup>	9.34 <sup>156</sup>	21.916 <sup>271</sup>	11.74 <sup>119</sup>
28.8	53.914 <sup>319</sup>	57.16 <sup>201</sup>	8.171 <sup>491</sup>	37.20 <sup>40</sup>	23.096 <sup>279</sup>	7.79 <sup>140</sup>	22.187 <sup>286</sup>	12.93 <sup>111</sup>
Aug. 7.8	54.233 <sup>336</sup>	55.15 <sup>156</sup>	8.662 <sup>508</sup>	36.80 <sup>10</sup>	23.375 <sup>289</sup>	6.39 <sup>119</sup>	22.473 <sup>295</sup>	14.04 <sup>100</sup>
17.8	54.569 <sup>345</sup>	53.59 <sup>105</sup>	9.170 <sup>517</sup>	36.70 <sup>20</sup>	23.664 <sup>292</sup>	5.20 <sup>96</sup>	22.768 <sup>299</sup>	15.04 <sup>84</sup>
27.8	54.914 <sup>348</sup>	52.54 <sup>48</sup>	9.687 <sup>518</sup>	36.90 <sup>47</sup>	23.956 <sup>292</sup>	4.24 <sup>65</sup>	23.067 <sup>298</sup>	15.88 <sup>65</sup>
Sept. 6.7	55.262 <sup>343</sup>	52.06 <sup>10</sup>	10.205 <sup>512</sup>	37.37 <sup>75</sup>	24.248 <sup>287</sup>	3.59 <sup>34</sup>	23.365 <sup>294</sup>	16.53 <sup>44</sup>
16.7	55.605 <sup>331</sup>	52.16 <sup>69</sup>	10.717 <sup>497</sup>	38.12 <sup>99</sup>	24.535 <sup>278</sup>	3.25 <sup>3</sup>	23.659 <sup>286</sup>	16.97 <sup>20</sup>
26.7	55.936 <sup>310</sup>	52.85 <sup>126</sup>	11.214 <sup>477</sup>	39.11 <sup>124</sup>	24.813 <sup>265</sup>	3.22 <sup>30</sup>	23.945 <sup>274</sup>	17.17 <sup>2</sup>
Oct. 6.7	56.246 <sup>284</sup>	54.11 <sup>180</sup>	11.691 <sup>450</sup>	40.35 <sup>145</sup>	25.078 <sup>249</sup>	3.52 <sup>62</sup>	24.219 <sup>258</sup>	17.15 <sup>26</sup>
16.6	56.530 <sup>252</sup>	55.91 <sup>227</sup>	12.141 <sup>415</sup>	41.80 <sup>165</sup>	25.327 <sup>230</sup>	4.14 <sup>89</sup>	24.477 <sup>241</sup>	16.89 <sup>45</sup>
26.6	56.782 <sup>214</sup>	58.18 <sup>265</sup>	12.556 <sup>374</sup>	43.45 <sup>181</sup>	25.557 <sup>206</sup>	5.03 <sup>113</sup>	24.718 <sup>218</sup>	16.44 <sup>63</sup>
Nov. 5.6	56.996 <sup>173</sup>	60.83 <sup>295</sup>	12.930 <sup>325</sup>	45.26 <sup>194</sup>	25.763 <sup>181</sup>	6.16 <sup>131</sup>	24.936 <sup>194</sup>	15.81 <sup>77</sup>
15.5	57.169 <sup>126</sup>	63.78 <sup>314</sup>	13.255 <sup>268</sup>	47.20 <sup>203</sup>	25.944 <sup>150</sup>	7.47 <sup>144</sup>	25.130 <sup>163</sup>	15.04 <sup>86</sup>
25.5	57.295 <sup>75</sup>	66.92 <sup>320</sup>	13.523 <sup>205</sup>	49.23 <sup>134</sup>	26.094 <sup>117</sup>	8.91 <sup>150</sup>	25.293 <sup>130</sup>	14.18 <sup>92</sup>
Dec. 5.5	57.371 <sup>26</sup>	70.12 <sup>315</sup>	13.728 <sup>134</sup>	51.32 <sup>207</sup>	26.211 <sup>80</sup>	10.41 <sup>152</sup>	25.423 <sup>94</sup>	13.26 <sup>98</sup>
15.5	57.396 <sup>28</sup>	73.27 <sup>300</sup>	13.862 <sup>61</sup>	53.39 <sup>200</sup>	26.291 <sup>41</sup>	11.93 <sup>147</sup>	25.517 <sup>54</sup>	12.33 <sup>90</sup>
25.4	57.368 <sup>80</sup>	76.27 <sup>277</sup>	13.923 <sup>16</sup>	55.39 <sup>186</sup>	26.332 <sup>1</sup>	13.40 <sup>137</sup>	25.571 <sup>12</sup>	11.43 <sup>86</sup>
35.4	57.288	79.04	13.907	57.25	26.333	14.77	25.583	10.57
Mean Place	53.125	79.29	5.010	40.34	21.091	21.10	19.982	2.75
Sec $\delta$ , Tan $\delta$	1.346	—0.901	1.817	+1.517	1.002	—0.059	1.007	+0.120
$D\psi a$ , $D_\omega a$	+0.04	+0.02	+0.10	—0.03	+0.06	0.00	+0.06	0.00
$\eta_\psi \delta$ , $D_\omega \delta$	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9	+0.1	+0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	9 Camelop. Mag. 4.4		4 Tauri. Mag. 5.1		π <sup>5</sup> Orionis. Mag. 3.9		ζ Aurigæ. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 45	° ' " +66 12	h m 4 46	° ' " +18 41	h m 4 49	° ' " + 2 18	h m 4 51	° ' " +33 2
	s	"	s	"	s	"	s	"
Jan. 0.4	52.24	25.12	33.414	64.99	57.867	24.34	37.855	17.20
10.4	52.13	27.32	33.408	64.80	57.856	23.30	37.851	17.79
20.4	51.93	29.24	33.358	64.60	57.806	22.37	37.796	18.29
30.3	51.65	30.80	33.268	64.40	57.717	21.57	37.696	18.67
Feb. 9.3	51.29	31.94	33.142	64.18	57.595	20.92	37.557	18.89
19.3	50.87	32.62	32.992	63.94	57.448	20.39	37.385	18.96
Mar. 1.3	50.42	32.81	32.824	63.66	57.284	20.02	37.193	18.85
11.2	49.96	32.50	32.648	63.37	57.113	19.80	36.993	18.54
21.2	49.52	31.72	32.475	63.06	56.946	19.73	36.797	18.08
31.2	49.11	30.49	32.320	62.75	56.791	19.82	36.618	17.48
Apr. 10.2	48.76	28.87	32.188	62.46	56.658	20.08	36.463	16.75
20.1	48.48	26.95	32.088	62.23	56.556	20.49	36.347	15.95
30.1	48.29	24.78	32.030	62.05	56.491	21.08	36.276	15.11
May 10.1	48.21	22.46	32.015	61.97	56.467	21.85	36.254	14.28
20.0	48.22	20.06	32.046	61.99	56.487	22.78	36.283	13.49
30.0	48.34	17.67	32.125	62.14	56.551	23.85	36.366	12.79
June 9.0	48.55	15.36	32.249	62.40	56.658	25.07	36.500	12.19
19.0	48.88	13.21	32.414	62.79	56.805	26.38	36.681	11.72
28.9	49.28	11.26	32.619	63.30	56.988	27.76	36.906	11.40
July 8.9	49.75	9.57	32.856	63.88	57.204	29.17	37.168	11.24
18.9	50.30	8.17	33.120	64.59	57.445	30.57	37.461	11.21
28.9	50.90	7.11	33.406	65.32	57.709	31.91	37.778	11.33
Aug. 7.8	51.53	6.39	33.707	66.06	57.987	33.13	38.113	11.58
17.8	52.20	6.02	34.018	66.79	58.276	34.22	38.460	11.92
27.8	52.88	6.00	34.332	67.47	58.569	35.10	38.814	12.36
Sept. 6.7	53.57	6.34	34.646	68.09	58.863	35.74	39.167	12.86
16.7	54.25	7.03	34.957	68.60	59.154	36.13	39.516	13.41
26.7	54.92	8.05	35.260	69.02	59.436	36.23	39.858	14.00
Oct. 6.7	55.56	9.38	35.550	69.31	59.708	36.06	40.188	14.61
16.6	56.17	11.01	35.824	69.49	59.965	35.64	40.502	15.23
26.6	56.72	12.89	36.083	69.54	60.205	34.97	40.796	15.88
Nov. 5.6	57.22	15.02	36.316	69.51	60.422	34.10	41.065	16.54
15.5	57.65	17.33	36.523	69.41	60.615	33.07	41.305	17.21
25.5	58.01	19.78	36.702	69.25	60.778	31.94	41.510	17.89
Dec. 5.5	58.26	22.31	36.844	69.08	60.908	30.73	41.676	18.58
15.5	58.42	24.85	36.948	68.88	61.002	29.51	41.798	19.27
25.4	58.49	27.32	37.010	68.68	61.056	28.34	41.872	19.93
35.4	58.45	29.64	37.028	68.47	61.069	27.24	41.895	20.55
Mean Place	47.437	12.27	31.010	58.61	55.628	20.81	35.156	8.90
Sec δ, Tan δ	2.478	+2.268	1.056	+0.338	1.001	+0.040	1.193	+0.650
D <sub>φ</sub> α, D <sub>ω</sub> α	+0.12	-0.05	+0.07	-0.01	+0.06	0.00	+0.08	-0.01
D <sub>φ</sub> δ, D <sub>ω</sub> δ	+0.1	+0.9	+0.1	+0.9	+0.1	+1.0	+0.1	+1.0



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Aurigæ. Var. 3.0-4.5		$\beta$ Camelop. Mag. 4.2		$\zeta$ Aurigæ. Mag. 3.9		$\iota$ Tauri. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 56	° ' " +43 42	h m 4 56	° ' " +60 19	h m 4 56	° ' " +40 57	h m 4 58	° ' " +21 28
	s "	"	s "	"	s "	"	s "	"
Jan. 0.4	3.684	15.55	5.82	32.43	43.363	30.47	10.491	26.63
10.4	3.676 <sup>8</sup>	16.72 <sup>117</sup>	5.77 <sup>5</sup>	34.41 <sup>198</sup>	43.357 <sup>6</sup>	31.49 <sup>102</sup>	10.496 <sup>5</sup>	26.59 <sup>4</sup>
20.4	3.609 <sup>67</sup>	17.74 <sup>102</sup>	5.64 <sup>13</sup>	36.16 <sup>175</sup>	43.297 <sup>60</sup>	32.38 <sup>89</sup>	10.454 <sup>42</sup>	26.54 <sup>5</sup>
30.3	3.489 <sup>120</sup>	18.57 <sup>83</sup>	5.44 <sup>20</sup>	37.61 <sup>145</sup>	43.185 <sup>112</sup>	33.09 <sup>71</sup>	10.370 <sup>84</sup>	26.47 <sup>7</sup>
Feb. 9.3	3.322 <sup>167</sup>	19.15 <sup>58</sup>	5.17 <sup>27</sup>	38.69 <sup>108</sup>	43.029 <sup>156</sup>	33.60 <sup>51</sup>	10.249 <sup>121</sup>	26.36 <sup>11</sup>
	203	32	32	68	191	27	149	15
19.3	3.119	19.47	4.85	39.37	42.838	33.87	10.100	26.21
Mar. 1.3	2.892 <sup>227</sup>	19.51 <sup>4</sup>	4.49 <sup>36</sup>	39.61 <sup>24</sup>	42.622 <sup>216</sup>	33.89 <sup>2</sup>	9.929 <sup>171</sup>	26.01 <sup>20</sup>
11.2	2.654 <sup>238</sup>	19.26 <sup>25</sup>	4.13 <sup>36</sup>	39.41 <sup>20</sup>	42.397 <sup>225</sup>	33.63 <sup>26</sup>	9.749 <sup>180</sup>	25.74 <sup>27</sup>
21.2	2.421 <sup>233</sup>	18.73 <sup>53</sup>	3.77 <sup>36</sup>	38.77 <sup>64</sup>	42.175 <sup>222</sup>	33.13 <sup>50</sup>	9.571 <sup>178</sup>	25.44 <sup>30</sup>
31.2	2.206 <sup>215</sup>	17.94 <sup>79</sup>	3.43 <sup>34</sup>	37.72 <sup>105</sup>	41.970 <sup>205</sup>	32.40 <sup>73</sup>	9.408 <sup>163</sup>	25.11 <sup>33</sup>
	186	99	29	139	175	91	141	35
Apr. 10.2	2.020	16.95	3.14	36.33	41.795	31.49	9.267	24.76
20.1	1.877 <sup>143</sup>	15.77 <sup>118</sup>	2.91 <sup>23</sup>	34.64 <sup>169</sup>	41.659 <sup>136</sup>	30.42 <sup>107</sup>	9.159 <sup>108</sup>	24.42 <sup>34</sup>
30.1	1.786 <sup>91</sup>	14.49 <sup>128</sup>	2.75 <sup>16</sup>	32.73 <sup>191</sup>	41.571 <sup>88</sup>	29.25 <sup>117</sup>	9.090 <sup>69</sup>	24.13 <sup>29</sup>
May 10.1	1.749 <sup>37</sup>	13.14 <sup>135</sup>	2.67 <sup>8</sup>	30.65 <sup>208</sup>	41.536 <sup>35</sup>	28.04 <sup>121</sup>	9.065 <sup>25</sup>	23.90 <sup>28</sup>
20.0	1.772 <sup>23</sup>	11.79 <sup>135</sup>	2.68 <sup>1</sup>	28.51 <sup>214</sup>	41.559 <sup>23</sup>	26.82 <sup>122</sup>	9.087 <sup>22</sup>	23.75 <sup>1.5</sup>
	84	131	10	214	81	115	69	5
30.0	1.856	10.48	2.78	26.37	41.640	25.67	9.156	23.70
June 9.0	1.999 <sup>143</sup>	9.27 <sup>121</sup>	2.96 <sup>18</sup>	24.30 <sup>207</sup>	41.777 <sup>137</sup>	24.60 <sup>107</sup>	9.272 <sup>116</sup>	23.77 <sup>7</sup>
19.0	2.196 <sup>197</sup>	8.18 <sup>109</sup>	3.21 <sup>25</sup>	22.36 <sup>194</sup>	41.968 <sup>191</sup>	23.66 <sup>94</sup>	9.431 <sup>159</sup>	23.96 <sup>1.9</sup>
28.9	2.443 <sup>247</sup>	7.24 <sup>94</sup>	3.53 <sup>32</sup>	20.59 <sup>177</sup>	42.207 <sup>239</sup>	22.87 <sup>79</sup>	9.629 <sup>198</sup>	24.26 <sup>3.0</sup>
July 8.9	2.734 <sup>291</sup>	6.50 <sup>74</sup>	3.92 <sup>39</sup>	19.06 <sup>153</sup>	42.486 <sup>279</sup>	22.26 <sup>61</sup>	9.861 <sup>232</sup>	24.66 <sup>4.8</sup>
	327	56	45	127	316	44	262	4.8
18.9	3.061	5.94	4.37	17.79	42.802	21.82	10.123	25.14
28.9	3.418 <sup>357</sup>	5.58 <sup>36</sup>	4.86 <sup>49</sup>	16.79 <sup>100</sup>	43.146 <sup>344</sup>	21.57 <sup>25</sup>	10.406 <sup>283</sup>	25.68 <sup>5.4</sup>
Aug. 7.8	3.797 <sup>379</sup>	5.43 <sup>15</sup>	5.38 <sup>52</sup>	16.10 <sup>69</sup>	43.511 <sup>365</sup>	21.49 <sup>8</sup>	10.708 <sup>302</sup>	26.26 <sup>5.8</sup>
17.8	4.192 <sup>395</sup>	5.45 <sup>2</sup>	5.94 <sup>56</sup>	15.71 <sup>39</sup>	43.890 <sup>379</sup>	21.59 <sup>10</sup>	11.020 <sup>312</sup>	26.85 <sup>5.9</sup>
27.8	4.594 <sup>402</sup>	5.67 <sup>22</sup>	6.51 <sup>57</sup>	15.64 <sup>7</sup>	44.277 <sup>387</sup>	21.85 <sup>26</sup>	11.338 <sup>318</sup>	27.42 <sup>5.9</sup>
	405	37	57	24	389	39	320	5.9
Sept. 6.7	4.999	6.04	7.08	15.88	44.666	22.24	11.658	27.94
16.7	5.401 <sup>402</sup>	6.57 <sup>53</sup>	7.65 <sup>57</sup>	16.41 <sup>53</sup>	45.053 <sup>387</sup>	22.76 <sup>52</sup>	11.976 <sup>318</sup>	28.39 <sup>6.5</sup>
26.7	5.794 <sup>393</sup>	7.25 <sup>68</sup>	8.20 <sup>55</sup>	17.24 <sup>83</sup>	45.432 <sup>379</sup>	23.39 <sup>63</sup>	12.287 <sup>311</sup>	28.76 <sup>7.0</sup>
Oct. 6.7	6.175 <sup>381</sup>	8.05 <sup>80</sup>	8.73 <sup>33</sup>	18.35 <sup>111</sup>	45.798 <sup>366</sup>	24.14 <sup>75</sup>	12.587 <sup>300</sup>	29.04 <sup>7.4</sup>
16.6	6.539 <sup>364</sup>	8.97 <sup>92</sup>	9.25 <sup>52</sup>	19.70 <sup>135</sup>	46.147 <sup>349</sup>	24.97 <sup>83</sup>	12.874 <sup>287</sup>	29.22 <sup>18</sup>
	340	102	47	160	328	91	270	12
26.6	6.879	9.99	9.72	21.30	46.475	25.88	13.144	29.34
Nov. 5.6	7.191 <sup>312</sup>	11.11 <sup>112</sup>	10.15 <sup>43</sup>	23.10 <sup>180</sup>	46.775 <sup>300</sup>	26.87 <sup>99</sup>	13.392 <sup>248</sup>	29.39 <sup>5</sup>
15.6	7.470 <sup>279</sup>	12.32 <sup>121</sup>	10.54 <sup>39</sup>	25.08 <sup>198</sup>	47.042 <sup>267</sup>	27.93 <sup>106</sup>	13.615 <sup>223</sup>	29.38 <sup>1</sup>
25.5	7.708 <sup>238</sup>	13.59 <sup>127</sup>	10.86 <sup>32</sup>	27.21 <sup>213</sup>	47.272 <sup>230</sup>	29.04 <sup>111</sup>	13.808 <sup>193</sup>	29.34 <sup>4</sup>
Dec. 5.5	7.899 <sup>191</sup>	14.90 <sup>131</sup>	11.11 <sup>25</sup>	29.41 <sup>220</sup>	47.458 <sup>186</sup>	30.18 <sup>114</sup>	13.966 <sup>158</sup>	29.29 <sup>5</sup>
	138	132	17	224	136	116	118	6
15.5	8.037	16.22	11.28	31.65	47.594	31.34	14.084	29.23
25.4	8.120 <sup>83</sup>	17.52 <sup>130</sup>	11.36 <sup>8</sup>	33.85 <sup>220</sup>	47.677 <sup>83</sup>	32.47 <sup>113</sup>	14.159 <sup>75</sup>	29.17 <sup>6</sup>
35.4	8.145 <sup>25</sup>	18.75 <sup>123</sup>	11.36 <sup>0</sup>	35.93 <sup>208</sup>	47.704 <sup>27</sup>	33.54 <sup>107</sup>	14.188 <sup>29</sup>	29.12 <sup>5</sup>
Mean Place	0.620	6.11	1.676	21.09	40.402	21.44	8.007	20.43
Sec $\delta$ , Tan $\delta$	1.383	+0.956	2.020	+1.755	1.324	+0.868	1.075	+0.393
$D\psi\alpha$ , $D_\omega\alpha$	+0.09	-0.02	+0.11	-0.03	+0.08	-0.02	+0.07	-0.01
$D\psi\delta$ , $D_\omega\delta$	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	11 Orionis. Mag. 4.6		77 Aurigæ. Mag. 3.3		ε Leporis. Mag. 3.3		β Eridani. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 4 59	° ' " +15 17	h m 5 0	° ' " +41 7	h m 5 1	° ' " -22 28	h m 5 3	° ' " - 5 11
	s	"	s	"	s	"	s	"
Jan. 0.4	51.898	27.48	44.512	33.07	59.012	54.42	48.376	31.92
10.4	51.903	27.10	44.511	34.11	58.981	56.59	48.370	33.38
20.4	51.864	26.75	44.454	35.02	58.906	58.52	48.323	34.67
30.4	51.783	26.43	44.345	35.76	58.791	60.14	48.236	35.77
Feb. 9.3	51.667	26.13	44.190	36.30	58.643	61.42	48.115	36.67
19.3	51.523	25.86	44.000	36.60	58.467	62.34	47.968	37.34
Mar. 1.3	51.358	25.60	43.784	36.65	58.273	62.89	47.800	37.80
11.2	51.185	25.35	43.557	36.43	58.070	63.06	47.624	38.02
21.2	51.013	25.13	43.333	35.96	57.869	62.86	47.449	38.03
31.2	50.854	24.93	43.126	35.25	57.679	62.29	47.286	37.80
Apr. 10.2	50.716	24.78	42.947	34.35	57.511	61.38	47.141	37.36
20.1	50.609	24.69	42.808	33.30	57.371	60.13	47.025	36.69
30.1	50.539	24.67	42.716	32.13	57.268	58.57	46.945	35.81
May 10.1	50.512	24.75	42.677	30.92	57.206	56.75	46.904	34.72
20.1	50.530	24.95	42.696	29.70	57.188	54.68	46.904	33.45
30.0	50.594	25.26	42.772	28.54	57.216	52.42	46.949	32.02
June 9.0	50.702	25.69	42.905	27.45	57.289	50.02	47.037	30.45
19.0	50.862	26.23	43.091	26.48	57.406	47.54	47.165	28.77
28.9	51.040	26.86	43.326	25.66	57.563	45.04	47.331	27.05
July 8.9	51.262	27.58	43.602	25.01	57.756	42.60	47.530	25.33
18.9	51.513	28.35	43.915	24.53	57.981	40.28	47.757	23.66
28.9	51.785	29.14	44.257	24.24	58.232	38.17	48.007	22.08
Aug. 7.8	52.073	29.92	44.620	24.11	58.504	36.31	48.274	20.67
17.8	52.374	30.65	44.998	24.15	58.789	34.79	48.554	19.47
27.8	52.681	31.31	45.384	24.35	59.085	33.67	48.841	18.52
Sept. 6.8	52.989	31.86	45.774	24.69	59.384	32.98	49.132	17.88
16.7	53.294	32.29	46.162	25.16	59.683	32.76	49.421	17.57
26.7	53.594	32.57	46.543	25.75	59.975	33.02	49.704	17.58
Oct. 6.7	53.883	32.69	46.913	26.45	60.257	33.76	49.978	17.95
16.6	54.160	32.67	47.285	27.24	60.524	34.96	50.239	18.66
26.6	54.420	32.51	47.598	28.12	60.770	36.58	50.484	19.65
Nov. 5.6	54.660	32.24	47.903	29.08	60.991	38.54	50.709	20.91
15.6	54.874	31.88	48.177	30.12	61.185	40.79	50.908	22.36
25.5	55.060	31.46	48.413	31.21	61.345	43.22	51.078	23.97
Dec. 5.5	55.212	31.02	48.605	32.35	61.468	45.76	51.216	25.64
15.5	55.326	30.56	48.746	33.50	61.550	48.31	51.316	27.33
25.5	55.398	30.12	48.834	34.64	61.588	50.79	51.376	28.97
35.4	55.427	29.71	48.867	35.73	61.582	53.11	51.394	30.50
Mean Place	49.503	22.30	41.525	24.32	56.812	54.23	46.147	34.02
Sec δ, Tan δ	1.037	+0.273	1.328	+0.873	1.082	-0.414	1.004	-0.091
D <sub>φ</sub> α, D <sub>φ</sub> α	+0.07	0.00	+0.08	-0.02	+0.05	+0.01	+0.06	0.00
D <sub>φ</sub> δ, D <sub>φ</sub> δ	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Aurigæ. Mag. 4.8		19 H. Camelop. Mag. 5.2		$\mu$ Leporis. Mag. 3.3		$\beta$ Orionis. (Rigel). Mag. 0.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 7	+38 23	h m 5 8	+79 8	h m 5 9	-16 17	h m 5 10	- 8 17
	s	"	s	"	s	"	s	"
Jan. 0.4	47.661	22.36	60.90	30.64	14.370	69.87	35.122	46.27
10.4	47.671	23.27	60.67	33.43	14.356	71.85	35.118	47.88
20.4	47.624	24.07	60.24	35.95	14.298	73.61	35.073	49.33
30.4	47.527	24.73	59.61	38.11	14.201	75.10	34.987	50.56
Feb. 9.3	47.385	25.23	58.81	39.82	14.068	76.29	34.866	51.57
19.3	47.206	25.51	57.88	41.01	13.907	77.18	34.718	52.32
Mar. 1.3	47.003	25.58	56.87	41.65	13.728	77.74	34.549	52.83
11.2	46.785	25.40	55.82	41.71	13.538	77.97	34.370	53.07
21.2	46.570	25.01	54.77	41.19	13.348	77.87	34.191	53.07
31.2	46.368	24.41	53.79	40.13	13.168	77.47	34.022	52.81
Apr. 10.2	46.193	23.62	52.91	38.56	13.008	76.74	33.871	52.30
20.1	46.053	22.70	52.18	36.56	12.876	75.73	33.749	51.55
30.1	45.960	21.68	51.60	34.22	12.778	74.43	33.661	50.57
May 10.1	45.917	20.62	51.23	31.61	12.720	72.87	33.611	49.36
20.1	45.929	19.55	51.06	28.83	12.704	71.10	33.604	47.96
30.0	45.996	18.52	51.11	25.97	12.733	69.15	33.640	46.38
June 9.0	46.117	17.56	51.36	23.12	12.805	67.04	33.719	44.67
19.0	46.290	16.72	51.82	20.35	12.919	64.84	33.839	42.86
28.9	46.510	16.02	52.47	17.76	13.073	62.62	33.996	41.00
July 8.9	46.771	15.46	53.30	15.39	13.261	60.42	34.187	39.15
18.9	47.067	15.05	54.28	13.32	13.481	58.32	34.408	37.35
28.9	47.391	14.81	55.40	11.58	13.725	56.37	34.652	35.68
Aug. 7.8	47.738	14.71	56.63	10.20	13.991	54.65	34.916	34.18
17.8	48.099	14.75	57.94	9.23	14.270	53.21	35.193	32.91
27.8	48.470	14.92	59.31	8.67	14.558	52.13	35.479	31.92
Sept. 6.8	48.845	15.22	60.72	8.53	14.851	51.43	35.768	31.27
16.7	49.220	15.61	62.13	8.82	15.144	51.15	36.057	30.96
26.7	49.589	16.09	63.53	9.54	15.432	51.31	36.343	31.02
Oct. 6.7	49.948	16.65	64.89	10.67	15.712	51.90	36.620	31.45
16.6	50.292	17.29	66.19	12.20	15.978	52.91	36.884	32.25
26.6	50.619	18.01	67.39	14.09	16.226	54.30	37.132	33.37
Nov. 5.6	50.920	18.78	68.47	16.33	16.453	56.02	37.361	34.76
15.6	51.191	19.62	69.40	18.86	16.652	58.00	37.565	36.38
25.5	51.428	20.52	70.17	21.62	16.821	60.17	37.740	38.16
Dec. 5.5	51.623	21.46	70.74	24.55	16.956	62.44	37.882	40.02
15.5	51.771	22.43	71.10	27.56	17.052	64.73	37.986	41.90
25.5	51.865	23.40	71.24	30.57	17.105	66.97	38.049	43.73
35.4	51.905	24.33	71.15	33.46	17.115	69.05	38.070	45.45
Mean Place	44.741	14.50	51.183	19.22	12.161	70.46	32.891	47.84
Sec $\delta$ , Tan $\delta$	1.276	+0.792	5.307	+5.212	1.042	-0.292	1.011	-0.146
$D\psi\alpha$ , $D\psi\alpha$	+0.08	-0.01	+0.20	-0.08	+0.05	0.00	+0.06	0.00
$D\psi\delta$ , $D\psi\delta$	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON,

Washington Mean Time.	$\alpha$ Aurigæ. (Capella.) Mag. 0.2		$\lambda$ Aurigæ. Mag. 4.8		$\tau$ Orionis. Mag. 3.7		$\sigma$ Columbæ. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m s 10	° ' " 54	h m s 13	° ' " 40 1	h m s 13	° ' " 6 55	h m s 14	° ' " 34 58
Jan. 0.4	36.534	62.18	21.016	43.24	36.792	57.77	31.580	34.69
10.4	36.542	63.48	21.032	44.22	36.793	59.34	31.531	37.36
20.4	36.486	64.65	20.992	45.11	36.751	60.75	31.434	39.75
30.4	36.373	65.64	20.898	45.84	36.669	61.94	31.294	41.76
Feb. 9.3	36.208	66.38	20.757	46.41	36.551	62.92	31.114	43.37
19.3	36.003	66.87	20.578	46.77	36.406	63.66	30.903	44.54
Mar. 1.3	35.770	67.05	20.371	46.88	36.239	64.17	30.671	45.26
11.3	35.522	66.93	20.151	46.74	36.061	64.42	30.428	45.52
21.2	35.274	66.51	19.930	46.37	35.883	64.44	30.185	45.33
31.2	35.042	65.79	19.722	45.77	35.715	64.21	29.952	44.68
Apr. 10.2	34.839	64.84	19.539	44.97	35.565	63.75	29.740	43.62
20.1	34.676	63.67	19.394	44.01	35.442	63.05	29.557	42.14
30.1	34.563	62.35	19.293	42.93	35.351	62.13	29.412	40.31
May 10.1	34.506	60.94	19.243	41.79	35.301	60.99	29.310	38.16
20.1	34.511	59.48	19.249	40.63	35.292	59.67	29.255	35.73
30.0	34.577	58.03	19.311	39.49	35.326	58.19	29.249	33.07
June 9.0	34.703	56.64	19.428	38.41	35.404	56.55	29.293	30.27
19.0	34.887	55.36	19.598	37.44	35.523	54.82	29.385	27.38
29.0	35.125	54.22	19.817	36.59	35.678	53.04	29.524	24.47
July 8.9	35.408	53.24	20.079	35.89	35.868	51.24	29.705	21.64
18.9	35.732	52.45	20.377	35.34	36.089	49.51	29.924	18.97
28.9	36.089	51.85	20.705	34.95	36.331	47.90	30.176	16.52
Aug. 7.8	36.471	51.44	21.057	34.73	36.594	46.44	30.453	14.40
17.8	36.873	51.24	21.425	34.66	36.870	45.21	30.753	12.67
27.8	37.285	51.22	21.804	34.72	37.155	44.24	31.066	11.40
Sept. 6.8	37.704	51.39	22.188	34.92	37.443	43.59	31.387	10.63
16.7	38.122	51.72	22.573	35.23	37.733	43.28	31.710	10.41
26.7	38.535	52.23	22.953	35.65	38.018	43.31	32.030	10.75
Oct. 6.7	38.937	52.90	23.323	36.17	38.296	43.72	32.339	11.66
16.6	39.324	53.70	23.679	36.78	38.563	44.47	32.632	13.10
26.6	39.690	54.64	24.018	37.49	38.813	45.55	32.903	15.03
Nov. 5.6	40.028	55.71	24.332	38.28	39.044	46.89	33.145	17.37
15.6	40.332	56.91	24.616	39.14	39.249	48.44	33.355	20.06
25.5	40.596	58.19	24.864	40.08	39.428	50.16	33.526	22.98
Dec. 5.5	40.813	59.55	25.069	41.08	39.574	51.96	33.655	26.05
15.5	40.976	60.94	25.228	42.11	39.681	53.78	33.737	29.14
25.5	41.080	62.34	25.332	43.14	39.748	55.54	33.768	32.15
35.4	41.122	63.71	25.379	44.15	39.774	57.20	33.749	34.99
Mean Place	33.306	53.67	18.021	35.62	34.551	59.47	29.293	33.35
Sec $\delta$ , Tan $\delta$	1.437	+1.033	1.306	+0.840	1.007	-0.122	1.220	-0.700
D $\phi$ $\alpha$ , D $\omega$ $\alpha$	+0.09	-0.01	+0.08	-0.01	+0.06	0.00	+0.04	+0.01
D $\phi$ $\delta$ , D $\omega$ $\delta$	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Orionis. (Bellatrix.) Mag. 1.7		$\beta$ Tauri. Mag. 1.8		17 Camelop. Mag. 5.8		$\beta$ Leporis. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 20	° ' " + 6 16	h m 5 21	° ' " +28 32	h m 5 22	° ' " +62 59	h m 5 24	° ' " -20 49
Jan. 0.4	43.058	34.70	5.326	24.26	24.28	67.20	43.577	29.08
10.4	43.076	33.79	5.353	24.61	24.27	69.38	43.569	31.34
20.4	43.050	32.98	5.328	24.94	24.17	71.39	43.516	33.34
30.4	42.982	32.29	5.256	25.23	23.98	73.13	43.421	35.06
Feb. 9.3	42.876	31.70	5.141	25.43	23.71	74.55	43.287	36.48
19.3	42.740	31.23	4.991	25.54	23.38	75.56	43.124	37.53
Mar. 1.3	42.581	30.87	4.815	25.53	23.00	76.14	42.938	38.24
11.3	42.411	30.64	4.625	25.40	22.58	76.26	42.740	38.58
21.2	42.238	30.51	4.433	25.14	22.18	75.92	42.538	38.57
31.2	42.075	30.49	4.250	24.78	21.80	75.14	42.345	38.19
Apr. 10.2	41.929	30.60	4.089	24.32	21.46	73.96	42.170	37.46
20.1	41.810	30.85	3.959	23.79	21.17	72.42	42.020	36.41
30.1	41.724	31.22	3.866	23.23	20.95	70.59	41.904	35.06
May 10.1	41.677	31.72	3.819	22.66	20.81	68.54	41.826	33.42
20.1	41.673	32.37	3.820	22.12	20.75	66.36	41.790	31.54
30.0	41.712	33.14	3.870	21.63	20.80	64.11	41.799	29.45
June 9.0	41.794	34.03	3.968	21.21	20.93	61.86	41.852	27.21
19.0	41.917	35.02	4.113	20.89	21.15	59.68	41.947	24.86
29.0	42.078	36.08	4.299	20.68	21.45	57.64	42.083	22.48
July 8.9	42.272	37.19	4.524	20.57	21.82	55.76	42.257	20.12
18.9	42.495	38.30	4.782	20.56	22.26	54.12	42.463	17.85
28.9	42.742	39.38	5.065	20.63	22.76	52.73	42.697	15.77
Aug. 7.8	43.009	40.38	5.371	20.78	23.30	51.63	42.954	13.91
17.8	43.289	41.27	5.691	20.99	23.87	50.82	43.229	12.37
27.8	43.578	41.98	6.021	21.24	24.47	50.32	43.515	11.19
Sept. 6.8	43.872	42.51	6.357	21.51	25.09	50.14	43.810	10.42
16.7	44.168	42.82	6.694	21.78	25.71	50.28	44.106	10.11
26.7	44.460	42.90	7.028	22.04	26.32	50.72	44.402	10.27
Oct. 6.7	44.746	42.73	7.356	22.29	26.92	51.49	44.690	10.90
16.7	45.023	42.34	7.673	22.51	27.51	52.55	44.967	11.99
26.6	45.285	41.74	7.974	22.73	28.06	53.89	45.226	13.50
Nov. 5.6	45.530	40.95	8.257	22.95	28.56	55.49	45.466	15.37
15.6	45.752	40.03	8.515	23.19	29.01	57.32	45.680	17.56
25.5	45.948	39.01	8.742	23.45	29.40	59.37	45.864	19.94
Dec. 5.5	46.111	37.94	8.934	23.73	29.72	61.56	46.010	22.45
15.5	46.237	36.87	9.084	24.04	29.96	63.84	46.117	25.01
25.5	46.323	35.83	9.188	24.37	30.10	66.15	46.181	27.51
35.4	46.366	34.85	9.242	24.71	30.14	68.40	46.199	29.87
Mean Place	40.711	31.57	2.635	18.52	19.643	58.21	41.340	29.19
Sec $\delta$ , Tan $\delta$	1.006	+0.110	1.138	+0.544	2.203	+1.963	1.070	-0.380
$D\psi\alpha$ , $D_\alpha\alpha$	+0.06	0.00	+0.08	-0.01	+0.11	-0.02	+0.05	0.00
$D\psi\delta$ , $D_\alpha\delta$	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\chi$ Aurigæ. Mag. 4.9		$\delta$ Orionis. Mag. 2.5		Groombridge 966. Mag. 6.4		$\alpha$ Leporis. Mag. 2.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 27	° ' " +32 7	h m 5 27	° ' " - 0 21	h m 5 28	° ' " +74 59	h m 5 29	° ' " -17 52
	s	"	s	"	s	"	s	"
Jan. 0.5	22.271	31 60.02	48.242	20 32.53	44.61	37.51	6.401	1 50.86
10.4	22.302	20 60.59	48.262	25 33.82	44.56	40.22	6.402	45 53.00
20.4	22.282	73 61.12	48.237	67 34.96	44.33	42.72	6.357	87 54.92
30.4	22.209	115 61.59	48.170	83 35.95	43.94	44.91	6.270	125 56.57
Feb. 9.3	22.094	154 61.95	48.065	105 36.78	43.43	46.71	6.145	157 57.94
19.3	21.940	181 62.20	47.930	129 37.41	42.81	48.06	5.988	179 58.97
Mar. 1.3	21.759	197 62.29	47.771	144 37.88	42.11	48.89	5.809	192 59.67
11.3	21.562	200 62.22	47.599	162 38.15	41.37	49.18	5.617	196 60.04
21.2	21.362	192 62.00	47.424	170 38.25	40.62	48.92	5.421	188 60.07
31.2	21.170	170 61.60	47.257	187 38.17	39.90	48.12	5.233	171 59.75
Apr. 10.2	21.000	142 61.11	47.106	204 37.90	39.24	46.83	5.062	147 59.11
20.2	20.858	100 60.51	46.981	221 37.47	38.67	45.10	4.915	113 58.17
30.1	20.758	56 59.82	46.887	238 36.84	38.22	43.00	4.802	94 56.93
May 10.1	20.702	25 59.09	46.831	255 36.05	37.91	40.62	4.726	76 55.43
20.1	20.696	44 58.37	46.817	272 35.09	37.74	38.02	4.691	35 53.68
30.0	20.740	93 57.68	46.845	289 33.97	37.72	35.32	4.700	203 51.73
June 9.0	20.833	143 57.06	46.915	306 32.73	37.87	32.58	4.752	230 49.62
19.0	20.976	185 56.51	47.026	323 31.40	38.16	29.88	4.845	257 47.42
29.0	21.161	225 56.05	47.175	340 30.00	38.60	27.31	4.979	284 45.16
July 8.9	21.386	261 55.71	47.357	357 28.57	39.17	24.92	5.150	314 42.92
18.9	21.647	287 55.47	47.569	374 27.16	39.86	22.77	5.353	341 40.77
28.9	21.934	311 55.35	47.806	391 25.82	40.65	20.90	5.583	368 38.77
Aug. 7.9	22.245	328 55.31	48.063	408 24.62	41.52	19.36	5.837	395 36.98
17.8	22.573	340 55.35	48.335	425 23.57	42.46	18.18	6.107	422 35.49
27.8	22.913	348 55.48	48.617	442 22.72	43.46	17.38	6.389	449 34.34
Sept. 6.8	23.261	349 55.64	48.905	459 22.14	44.50	16.96	6.680	476 33.59
16.7	23.610	347 55.84	49.196	476 21.85	45.54	16.93	6.974	503 33.26
26.7	23.957	342 56.08	49.485	493 21.84	46.58	17.32	7.267	530 33.38
Oct. 6.7	24.299	332 56.33	49.769	510 22.14	47.62	18.10	7.554	557 33.96
16.7	24.631	319 56.62	50.044	527 22.74	48.60	19.27	7.831	584 34.97
26.6	24.950	296 56.91	50.305	544 23.59	49.54	20.81	8.092	611 36.38
Nov. 5.6	25.246	272 57.26	50.550	561 24.69	50.40	22.68	8.335	638 38.15
15.6	25.518	242 57.62	50.772	578 25.96	51.16	24.88	8.552	665 40.21
25.6	25.760	203 58.06	50.968	595 27.36	51.81	27.33	8.741	692 42.47
Dec. 5.5	25.963	162 58.53	51.132	612 28.83	52.32	29.99	8.894	719 44.85
15.5	26.125	115 59.05	51.260	629 30.33	52.68	32.77	9.008	746 47.27
25.5	26.240	62 59.59	51.347	646 31.78	52.88	35.59	9.079	773 49.66
35.4	26.302	55 60.14	51.392	663 33.15	52.91	38.37	9.106	799 51.92
Mean Place	19.471	54.32	45.937	34.69	37.064	28.43	4.156	51.25
Sec $\delta$ , Tan $\delta$	1.181	+0.628	1.000	-0.006	3.862	+3.730	1.051	-0.323
$D\phi\alpha$ , $D\omega\alpha$	+0.08	-0.01	+0.06	0.00	+0.16	-0.03	+0.05	0.00
$D\phi\delta$ , $D\omega\delta$	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0	+0.1	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\phi^1$ Orionis. Mag. 4.5			$\iota$ Orionis. Mag. 2.9			$\epsilon$ Orionis. Mag. 1.8			$\zeta$ Tauri. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "
	5 30		+ 9 26	5 31		- 5 57	5 32		- 1 15	5 32		+21 5
		s	"		s	"		s	"		s	"
Jan. 0.5	18.175		6.44	24.638		47.17	2.382		12.25	43.590		38.61
10.4	18.204	29	5.69	24.655	17	48.75	2.404	22	13.60	43.626	36	38.52
20.4	18.187	17	5.03	24.628	27	50.18	2.382	22	14.80	43.614	12	38.47
30.4	18.126	61	4.45	24.559	69	51.41	2.317	65	15.84	43.555	59	38.44
Feb. 9.3	18.028	98	3.98	24.452	107	52.43	2.214	103	16.70	43.454	101	38.40
		132			138			134			135	
19.3	17.896		3.60	24.314		53.21	2.080		17.37	43.319		38.34
Mar. 1.3	17.741	155	3.28	24.151	163	53.77	1.922	158	17.86	43.156	163	38.26
11.3	17.571	170	3.07	23.976	175	54.09	1.750	172	18.15	42.979	177	38.13
21.2	17.397	174	2.93	23.797	179	54.18	1.574	176	18.25	42.797	182	37.97
31.2	17.232	165	2.88	23.624	173	54.02	1.406	168	18.17	42.622	175	37.76
		151			155			154			156	
Apr. 10.2	17.081	123	2.91	23.469	131	53.65	1.252	128	17.89	42.466	129	37.52
20.2	16.958	93	3.04	23.338	101	53.04	1.124	97	17.43	42.337	96	37.28
30.1	16.865	52	3.28	23.237	63	52.22	1.027	59	16.78	42.241	54	37.06
May 10.1	16.813	12	3.63	23.174	22	51.20	0.968	18	15.96	42.187	10	36.86
20.1	16.801	32	4.09	23.152	20	49.98	0.950	23	14.97	42.177	36	36.72
30.0	16.833		4.66	23.172		48.60	0.973		13.82	42.213		36.64
June 9.0	16.909	76	5.35	23.234	62	47.08	1.039	66	12.55	42.295	82	36.64
19.0	17.026	117	6.13	23.337	103	45.45	1.146	107	11.18	42.420	125	36.73
29.0	17.181	155	6.98	23.477	140	43.76	1.289	143	9.74	42.585	165	36.90
July 8.9	17.371	190	7.88	23.653	176	42.07	1.467	178	8.29	42.787	202	37.15
		230			206			209			233	
18.9	17.591		8.80	23.859		40.42	1.676		6.85	43.020		37.46
28.9	17.834	243	9.70	24.090	231	38.86	1.909	233	5.48	43.280	260	37.81
Aug. 7.9	18.099	265	10.55	24.342	252	37.45	2.163	254	4.25	43.560	280	38.18
17.8	18.378	279	11.29	24.610	268	36.26	2.432	269	3.18	43.856	296	38.54
27.8	18.668	296	11.92	24.889	290	35.31	2.712	280	2.33	44.164	308	38.88
					296			287			315	
Sept. 6.8	18.964		12.37	25.175		34.68	2.999		1.75	44.479		39.16
16.7	19.262	298	12.63	25.464	289	34.37	3.290	291	1.46	44.796	317	39.35
26.7	19.559	297	12.71	25.752	288	34.40	3.579	289	1.46	45.112	316	39.47
Oct. 6.7	19.851	292	12.57	26.035	283	34.79	3.863	284	1.78	45.424	312	39.51
16.7	20.134	283	12.22	26.310	275	35.53	4.140	277	2.41	45.726	302	39.46
		272			261			263			292	
26.6	20.406		11.70	26.571		36.59	4.403		3.30	46.018		39.33
Nov. 5.6	20.660	254	11.01	26.816	245	37.91	4.650	247	4.45	46.293	275	39.13
15.6	20.893	233	10.21	27.038	222	39.45	4.876	226	5.77	46.545	252	38.91
25.6	21.100	207	9.33	27.234	196	41.16	5.074	198	7.23	46.769	224	38.68
Dec. 5.5	21.275	175	8.41	27.397	163	42.95	5.242	168	8.77	46.962	193	38.46
		139			126			131			153	
15.5	21.414		7.50	27.523		44.77	5.373		10.32	47.115		38.26
25.5	21.512	98	6.62	27.609	86	46.55	5.463	90	11.84	47.225	110	38.09
35.4	21.566	54	5.81	27.651	42	48.22	5.511	48	13.27	47.289	64	37.98
Mean Place	15.778		3.34	22.359		48.67	0.075		14.21	41.020		34.40
Sec $\delta$ , Tan $\delta$	1.014		+0.166	1.005		-0.104	1.000		-0.022	1.072		+0.386
$D\alpha$ , $D_{\alpha}$	+0.07		0.00	+0.06		0.00	+0.06		0.00	+0.07		0.00
$D\delta$ , $D_{\delta}$	+0.1		+1.0	0.0		+1.0	0.0		+1.0	0.0		+1.0



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Orionis. Mag. 2.0			α Columbæ. Mag. 2.8			ο Aurigæ. Mag. 5.5			ζ Leporis. Mag. 3.7		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	5	36	- 1 58	5	36	-34 6	5	39	+49 47	5	43	-14 50
	s		"	s		"	s		"	s		"
Jan. 0.5	36.535		66.70	40.923		64.80	31.655		34.69	13.910		66.73
10.4	36.561	26	68.11	40.900	23	67.59	31.697	42	36.25	13.928	18	68.79
20.4	36.541	20	69.37	40.826	74	70.11	31.670	27	37.73	13.900	28	70.67
30.4	36.480	61	70.45	40.705	121	72.29	31.575	95	39.05	13.828	72	72.29
Feb. 9.3	36.379	101	71.35	40.541	164	74.09	31.420	155	40.14	13.716	112	73.65
		132	70		197			206			144	106
19.3	36.247		72.05	40.344		75.48	31.214		40.97	13.572		74.71
Mar. 1.3	36.090	157	72.56	40.121	223	76.42	30.972	242	41.51	13.402	170	75.45
11.3	35.919	171	72.86	39.883	238	76.90	30.705	267	41.70	13.217	185	75.89
21.2	35.743	176	72.97	39.640	243	76.93	30.431	274	41.55	13.026	191	76.01
31.2	35.573	170	72.89	39.404	236	76.51	30.167	254	41.08	12.840	186	75.81
		155	29		218			242			171	49
Apr. 10.2	35.418		72.60	39.186		75.67	29.925		40.30	12.669		75.32
20.2	35.287	131	72.13	38.993	193	74.41	29.721	204	39.25	12.520	149	74.53
30.1	35.186	101	71.46	38.834	159	72.78	29.565	156	37.96	12.403	117	73.46
May 10.1	35.123	63	70.62	38.716	118	70.80	29.465	100	36.51	12.321	82	72.14
20.1	35.100	23	69.61	38.642	74	68.54	29.427	38	34.95	12.279	42	70.58
		19	117		27			25			0	175
30.0	35.119		68.44	38.615		66.03	29.452		33.33	12.279		68.83
June 9.0	35.180	61	67.15	38.636	21	63.33	29.542	90	31.71	12.321	42	66.92
19.0	35.281	101	65.75	38.705	69	60.52	29.695	153	30.13	12.405	84	64.90
29.0	35.420	139	64.29	38.820	115	57.68	29.905	210	28.64	12.529	129	62.81
July 8.9	35.594	174	62.81	38.978	158	54.87	30.169	264	27.26	12.688	159	60.73
		204	145		197			311			191	202
18.9	35.798		61.36	39.175		52.17	30.480		26.06	12.879		58.71
28.9	36.027	229	59.98	39.405	230	49.69	30.831	351	25.03	13.099	220	56.82
Aug. 7.9	36.279	252	58.72	39.666	261	47.49	31.213	382	24.18	13.342	243	55.13
17.8	36.546	267	57.65	39.949	283	45.66	31.622	409	23.54	13.604	262	53.68
27.8	36.824	278	56.79	40.252	303	44.24	32.050	428	23.09	13.880	276	52.56
		286	59		314			441			285	75
Sept. 6.8	37.110		56.20	40.566		43.34	32.491		22.86	14.165		51.81
16.7	37.400	260	55.91	40.886	320	42.96	32.939	448	22.82	14.455	290	51.45
26.7	37.689	280	55.93	41.208	322	43.13	33.387	448	22.99	14.747	292	51.52
Oct. 6.7	37.974	285	56.27	41.523	315	43.87	33.829	442	23.35	15.036	289	52.03
16.7	38.252	278	56.92	41.825	302	45.16	34.261	432	23.91	15.317	281	52.94
		266	92		287			416			269	131
26.6	38.518		57.84	42.112		46.95	34.677		24.67	15.586		54.25
Nov. 5.6	38.766	248	59.02	42.373	261	49.19	35.067	390	25.61	15.837	251	55.91
15.6	38.995	229	60.39	42.606	233	51.80	35.425	358	26.73	16.067	230	57.84
25.6	39.197	202	61.90	42.802	196	54.67	35.743	318	28.00	16.268	201	59.99
Dec. 5.5	39.368	171	63.50	42.956	154	57.72	36.012	269	29.41	16.437	169	62.26
		134	161		109			213			131	232
15.5	39.502		65.11	43.065		60.83	36.225		30.93	16.568		64.58
25.5	39.597	95	66.67	43.124	59	63.90	36.375	150	32.51	16.656	88	66.86
35.4	39.648	51	68.17	43.131	7	66.83	36.456	81	34.09	16.700	44	69.04
Mean Place	34.227		68.47	38.609		64.00	28.107		28.40	11.644		67.32
Sec δ, Tan δ	1.001		-0.035	1.208		-0.677	1.549		+1.183	1.035		-0.265
Dψ α, Dω α	+0.06		0.00	+0.04		0.00	+0.09		-0.01	+0.05		0.00
Dψ δ, Dω δ	0.0		+1.0	0.0		+1.0	0.0		+1.0	0.0		+1.0



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Orionis. Mag. 2.2		$\delta$ Doradus. Mag. 4.5		$\nu$ Aurigæ. Mag. 4.2		$\delta$ Leporis. Mag. 3.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 43	° ' " - 9 41	h m 5 44	° ' " -65 45	h m 5 45	° ' " +39 7	h m 5 47	° ' " -20 52
	s	"	s	"	s	"	s	"
Jan. 0.5	51.466	52.68	40.61	61.68	47.262	36.60	47.352	66.94
10.4	51.491	54.52	40.42	65.04	47.315	37.56	47.367	69.33
20.4	51.470	56.16	40.14	68.09	47.308	38.50	47.333	71.48
30.4	51.405	57.59	39.77	70.75	47.246	39.36	47.255	73.38
Feb. 9.4	51.301	58.77	39.33	72.95	47.131	40.08	47.136	74.96
19.3	51.165	59.71	38.84	74.64	46.972	40.64	46.983	76.19
Mar. 1.3	51.002	60.37	38.30	75.81	46.780	41.01	46.805	77.09
11.3	50.825	60.77	37.73	76.43	46.565	41.14	46.610	77.62
21.2	50.641	60.89	37.16	76.49	46.343	41.05	46.409	77.78
31.2	50.462	60.74	36.60	76.01	46.128	40.72	46.211	77.57
Apr. 10.2	50.299	60.35	36.06	75.02	45.930	40.19	46.028	77.02
20.2	50.157	59.69	35.56	73.53	45.762	39.47	45.867	76.15
30.1	50.046	58.79	35.12	71.59	45.634	38.61	45.736	74.95
May 10.1	49.970	57.65	34.75	69.26	45.552	37.63	45.640	73.46
20.1	49.934	56.32	34.45	66.56	45.521	36.58	45.586	71.71
30.1	49.940	54.81	34.24	63.59	45.545	35.51	45.574	69.75
June 9.0	49.986	53.13	34.12	60.42	45.621	34.46	45.605	67.61
19.0	50.075	51.36	34.09	57.10	45.751	33.45	45.680	65.36
29.0	50.202	49.53	34.15	53.75	45.929	32.52	45.795	63.04
July 8.9	50.364	47.68	34.30	50.45	46.152	31.68	45.947	60.73
18.9	50.557	45.88	34.54	47.29	46.414	30.97	46.133	58.49
28.9	50.778	44.20	34.85	44.38	46.710	30.37	46.351	56.40
Aug. 7.9	51.020	42.68	35.25	41.81	47.031	29.89	46.592	54.53
17.8	51.282	41.39	35.70	39.65	47.376	29.53	46.855	52.96
27.8	51.556	40.37	36.20	38.00	47.736	29.29	47.132	51.72
Sept. 6.8	51.839	39.68	36.74	36.92	48.107	29.15	47.421	50.90
16.8	52.128	39.35	37.30	36.47	48.483	29.12	47.717	50.52
26.7	52.417	39.41	37.86	36.66	48.863	29.19	48.014	50.61
Oct. 6.7	52.704	39.84	38.42	37.50	49.239	29.35	48.309	51.18
16.7	52.984	40.66	38.95	39.00	49.607	29.62	48.596	52.22
26.6	53.252	41.83	39.44	41.08	49.961	29.99	48.872	53.69
Nov. 5.6	53.503	43.30	39.86	43.69	50.298	30.45	49.128	55.54
15.6	53.734	45.03	40.22	46.74	50.609	31.02	49.363	57.72
25.6	53.938	46.94	40.50	50.12	50.890	31.70	49.568	60.13
Dec. 5.5	54.111	48.96	40.68	53.73	51.130	32.47	49.738	62.71
15.5	54.246	51.01	40.77	57.43	51.324	33.34	49.869	65.34
25.5	54.341	53.03	40.75	61.10	51.466	34.27	49.957	67.94
35.5	54.392	54.96	40.62	64.61	51.552	35.23	49.999	70.43
Mean Place	49.186	53.66	37.312	60.00	44.198	31.68	45.084	67.11
Sec $\delta$ , Tan $\delta$	1.014	-0.171	2.437	-2.222	1.289	+0.813	1.070	-0.382
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06	0.00	0.00	+0.01	+0.08	0.00	+0.05	0.00
$D_{\psi} \delta$ , $D_{\omega} \delta$	0.0	+1.0	0.0	+1.0	0.0	+1.0	0.0	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Orionis. (Betelgeuz.) Var. 1.0-1.4		$\eta$ Leporis. Mag. 3.8		$\delta$ Aurigæ. Mag. 3.9		$\beta$ Aurigæ. Mag. 2.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 5 50	° ' " + 7 23	h m 5 52	° ' " -14 10	h m 5 52	° ' " +54 16	h m 5 53	° ' " +44 56
	s	"	s	"	s	"	s	"
Jan. 0.5	43.093	35.43	39.737	54.69	45.533	53.00	29.793	29.88
10.4	43.140	34.51	39.764	56.76	45.594	54.81	29.856	31.19
20.4	43.139	33.69	39.746	58.65	45.577	56.54	29.853	32.45
30.4	43.093	33.01	39.682	60.29	45.483	58.11	29.787	33.60
Feb. 9.4	43.006	32.44	39.578	61.68	45.320	59.47	29.663	34.61
19.3	42.883	31.98	39.440	62.77	45.100	60.54	29.490	35.40
Mar. 1.3	42.734	31.64	39.275	63.55	44.834	61.28	29.279	35.95
11.3	42.567	31.42	39.094	64.03	44.540	61.66	29.043	36.22
21.3	42.393	31.29	38.904	64.19	44.234	61.66	28.796	36.21
31.2	42.223	31.27	38.717	64.04	43.933	61.28	28.554	35.90
Apr. 10.2	42.067	31.35	38.545	63.61	43.654	60.54	28.331	35.33
20.2	41.932	31.54	38.393	62.87	43.413	59.48	28.138	34.50
30.1	41.829	31.81	38.270	61.88	43.221	58.15	27.987	33.48
May 10.1	41.761	32.25	38.182	60.62	43.088	56.60	27.886	32.28
20.1	41.733	32.78	38.133	59.13	43.020	54.88	27.840	30.99
30.1	41.747	33.43	38.126	57.45	43.023	53.06	27.851	29.63
June 9.0	41.803	34.18	38.160	55.60	43.094	51.20	27.921	28.25
19.0	41.898	35.01	38.236	53.64	43.235	49.36	28.047	26.90
29.0	42.033	35.92	38.352	51.61	43.440	47.58	28.227	25.62
July 8.9	42.203	36.86	38.503	49.58	43.705	45.91	28.457	24.44
18.9	42.404	37.80	38.686	47.61	44.023	44.38	28.730	23.36
28.9	42.631	38.72	38.900	45.74	44.388	43.02	29.040	22.42
Aug. 7.9	42.881	39.57	39.136	44.06	44.792	41.87	29.382	21.63
17.8	43.147	40.29	39.393	42.63	45.228	40.92	29.749	21.00
27.8	43.426	40.89	39.664	41.51	45.687	40.21	30.135	20.51
Sept. 6.8	43.715	41.30	39.946	40.75	46.164	39.71	30.536	20.18
16.8	44.009	41.49	40.235	40.37	46.652	39.46	30.945	20.01
26.7	44.305	41.47	40.527	40.42	47.145	39.45	31.357	19.99
Oct. 6.7	44.600	41.22	40.816	40.88	47.634	39.68	31.767	20.12
16.7	44.889	40.75	41.101	41.76	48.117	40.15	32.171	20.41
26.6	45.169	40.07	41.373	43.04	48.582	40.86	32.561	20.86
Nov. 5.6	45.435	39.22	41.630	44.67	49.021	41.80	32.933	21.46
15.6	45.682	38.25	41.867	46.57	49.427	42.97	33.278	22.24
25.6	45.904	37.18	42.077	48.70	49.790	44.34	33.589	23.15
Dec. 5.5	46.097	36.07	42.255	50.95	50.101	45.90	33.857	24.21
15.5	46.254	34.96	42.396	53.26	50.350	47.60	34.075	25.39
25.5	46.370	33.89	42.495	55.53	50.529	49.38	34.237	26.64
35.5	46.441	32.89	42.549	57.71	50.633	51.20	34.335	27.94
Mean Place	40.683	33.32	37.461	55.27	41.636	47.67	26.464	25.22
Sec $\delta$ , Tan $\delta$	1.008	+0.130	1.031	-0.253	1.713	+1.391	1.413	+0.998
$D\psi a$ , $D\omega a$	+0.06	0.00	+0.05	0.00	+0.10	0.00	+0.08	0.00
$D\psi \delta$ , $D\omega \delta$	0.0	+1.0	0.0	+1.0	0.0	+1.0	0.0	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Aurigæ. Mag. 2.7		1 Geminorum. Mag. 4.3		1 G. Puppis. Mag. 6.2		$\gamma$ Orionis. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	5 54	+37 12	5 59	+23 16	6 2	-45 1	6 2	+14 46
	s	"	s	"	s	"	s	"
Jan. 0.5	6.702	32.65	7.161	10.62	7.553	70.36	52.529	47.84
10.4	6.766	33.51	7.226	10.62	7.529	73.61	52.592	47.33
20.4	6.770	34.35	7.238	10.68	7.445	76.58	52.605	46.90
30.4	6.717	35.14	7.201	10.77	7.303	79.22	52.571	46.56
Feb. 9.4	6.613	35.82	7.118	10.87	7.111	81.45	52.493	46.30
19.3	6.464	36.37	6.994	10.96	6.877	83.25	52.376	46.10
Mar. 1.3	6.281	36.75	6.839	11.02	6.609	84.57	52.230	45.95
11.3	6.074	36.91	6.664	11.03	6.320	85.38	52.063	45.84
21.3	5.859	36.88	6.480	10.97	6.022	85.69	51.888	45.75
31.2	5.648	36.62	6.298	10.85	5.725	85.50	51.714	45.69
Apr. 10.2	5.453	36.18	6.130	10.67	5.442	84.83	51.552	45.66
20.2	5.286	35.57	5.984	10.44	5.183	83.68	51.411	45.66
30.1	5.156	34.80	5.871	10.18	4.958	82.10	51.300	45.70
May 10.1	5.070	33.93	5.795	9.92	4.773	80.12	51.225	45.80
20.1	5.034	33.00	5.762	9.68	4.635	77.81	51.190	45.96
30.1	5.049	32.04	5.773	9.47	4.548	75.18	51.197	46.21
June 9.0	5.116	31.08	5.830	9.29	4.514	72.33	51.245	46.51
19.0	5.234	30.16	5.931	9.17	4.534	69.31	51.336	46.89
29.0	5.400	29.31	6.072	9.11	4.608	66.23	51.467	47.32
July 9.0	5.609	28.53	6.253	9.11	4.732	63.16	51.633	47.80
18.9	5.858	27.86	6.467	9.16	4.905	60.19	51.832	48.30
28.9	6.138	27.29	6.709	9.24	5.123	57.39	52.058	48.80
Aug. 7.9	6.447	26.81	6.976	9.35	5.380	54.88	52.308	49.27
17.8	6.777	26.44	7.264	9.45	5.672	52.73	52.576	49.68
27.8	7.125	26.16	7.566	9.54	5.990	51.03	52.860	50.00
Sept. 6.8	7.484	25.97	7.878	9.58	6.330	49.85	53.154	50.20
16.8	7.851	25.86	8.197	9.58	6.685	49.23	53.455	50.27
26.7	8.220	25.83	8.519	9.51	7.046	49.22	53.761	50.19
Oct. 6.7	8.589	25.88	8.841	9.38	7.406	49.82	54.067	49.94
16.7	8.952	26.00	9.160	9.18	7.758	51.03	54.369	49.56
26.7	9.303	26.22	9.468	8.93	8.094	52.82	54.664	49.05
Nov. 5.6	9.639	26.53	9.764	8.66	8.402	55.12	54.947	48.44
15.6	9.951	26.94	10.042	8.37	8.678	57.88	55.211	47.74
25.6	10.234	27.45	10.293	8.10	8.913	60.98	55.453	47.00
Dec. 5.5	10.479	28.06	10.513	7.88	9.100	64.31	55.665	46.26
15.5	10.680	28.78	10.696	7.71	9.232	67.76	55.841	45.57
25.5	10.830	29.56	10.835	7.60	9.306	71.22	55.975	44.91
35.5	10.925	30.40	10.926	7.56	9.320	74.59	56.064	44.34
Mean Place	3.685	28.56	4.505	7.83	5.082	69.80	50.011	45.79
Sec $\delta$ , Tan $\delta$	1.256	+0.759	1.089	+0.430	1.415	-1.002	1.034	+0.264
$D\psi\alpha$ , $D_\omega\alpha$	+0.08	0.00	+0.07	0.00	+0.03	0.00	+0.07	0.00
$D\psi\delta$ , $D_\omega\delta$	0.0	+1.0	0.0	+1.0	0.0	+1.0	0.0	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	22 H. Camelop. Mag. 4.7		77 Geminorum. Var. 3.2-4.2		2 Lynx. Mag. 4.4		ζ Canis Majoris. Mag. 3.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 9	° ' " +69 20	h m 6 9	° ' " +22 31	h m 6 12	° ' " +59 2	h m 6 17	° ' " -30 1
	s	"	s	"	s	"	s	"
Jan. 0.5	48.24	67.75	54.755	56.99	22.586	37.09	9.844	33.95
10.5	48.33	70.28	54.829	56.93	22.679	39.14	9.874	36.82
20.4	48.30	72.73	54.851	56.95	22.682	41.15	9.851	39.48
30.4	48.13	75.01	54.823	57.02	22.597	43.03	9.778	41.87
Feb. 9.4	47.85	77.00	54.747	57.11	22.432	44.69	9.658	43.91
19.3	47.47	78.64	54.630	57.21	22.196	46.09	9.498	45.57
Mar. 1.3	47.02	79.86	54.482	57.28	21.904	47.13	9.308	46.83
11.3	46.51	80.61	54.310	57.31	21.574	47.78	9.094	47.69
21.3	45.97	80.87	54.128	57.30	21.222	48.02	8.870	48.11
31.2	45.44	80.62	53.945	57.23	20.872	47.84	8.645	48.11
Apr. 10.2	44.93	79.88	53.775	57.10	20.539	47.25	8.430	47.69
20.2	44.47	78.69	53.625	56.94	20.241	46.29	8.233	46.87
30.2	44.09	77.09	53.506	56.74	19.992	44.98	8.064	45.67
May 10.1	43.80	75.16	53.424	56.53	19.805	43.39	7.927	44.12
20.1	43.60	72.95	53.382	56.33	19.688	41.58	7.830	42.27
30.1	43.50	70.56	53.383	56.15	19.647	39.61	7.776	40.13
June 9.0	43.52	68.05	53.429	56.01	19.684	37.54	7.765	37.78
19.0	43.66	65.47	53.519	55.91	19.796	35.44	7.798	35.27
29.0	43.90	62.93	53.650	55.87	19.984	33.35	7.874	32.65
July 9.0	44.24	60.48	53.819	55.87	20.240	31.34	7.992	30.02
18.9	44.67	58.17	54.022	55.91	20.559	29.45	8.148	27.46
28.9	45.19	56.06	54.253	55.97	20.936	27.72	8.339	25.04
Aug. 7.9	45.78	54.18	54.511	56.05	21.359	26.19	8.562	22.84
17.9	46.44	52.59	54.788	56.11	21.824	24.86	8.812	20.93
27.8	47.14	51.29	55.082	56.15	22.322	23.78	9.084	19.39
Sept. 6.8	47.88	50.30	55.389	56.14	22.844	22.94	9.374	18.29
16.8	48.65	49.66	55.703	56.06	23.386	22.37	9.679	17.69
26.7	49.43	49.38	56.023	55.91	23.937	22.08	9.989	17.61
Oct. 6.7	50.22	49.47	56.345	55.68	24.491	22.07	10.303	18.08
16.7	50.99	49.91	56.664	55.39	25.039	22.35	10.614	19.08
26.7	51.75	50.73	56.976	55.05	25.572	22.92	10.915	20.59
Nov. 5.6	52.46	51.91	57.276	54.67	26.083	23.78	11.202	22.57
15.6	53.12	53.44	57.560	54.29	26.558	24.92	11.465	24.94
25.6	53.70	55.27	57.820	53.92	26.988	26.31	11.701	27.64
Dec. 5.6	54.20	57.38	58.050	53.59	27.360	27.95	11.900	30.56
15.5	54.60	59.70	58.243	53.34	27.666	29.77	12.057	33.60
25.5	54.89	62.16	58.392	53.15	27.894	31.73	12.167	36.64
35.5	55.04	64.71	58.494	53.05	28.036	33.77	12.227	39.62
Mean Place	42.225	63.47	52.098	54.92	18.204	33.52	7.529	34.03
Sec δ, Tan δ	2.836	+2.654	1.083	+0.415	1.944	+1.667	1.155	-0.578
Dψ α, Dω α	+0.13	+0.01	+0.07	0.00	+0.11	+0.01	+0.05	0.00
Dψ δ, Dω δ	0.0	+1.0	0.0	+1.0	0.0	+1.0	0.0	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Geminorum. Mag. 3.2			$\psi^1$ Aurigæ. Mag. 5.1			$\beta$ Canis Majoris. Mag. 2.0			$\delta$ Monocerotis. Mag. 4.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	"	h	m	"	h	m	"	h	m	"
	6	17	+22 33	6	18	+49 19	6	19	-17 54	6	19	+ 4 38
	s		"	s		"	s		"	s		"
Jan. 0.5	59.052	83	27.86	34.155	99	56.57	4.946	48	49.37	24.633	71	10.40
10.5	59.135	30	27.79	34.254	26	58.11	4.994	154	51.74	24.704	23	9.24
20.4	59.165	21	27.80	34.280	46	59.64	4.994	0	53.92	24.727	24	8.21
30.4	59.144	69	27.87	34.234	111	61.10	4.947	133	55.87	24.703	69	7.33
Feb. 9.4	59.075	111	27.97	34.123	169	62.43	4.855	131	57.52	24.634	107	6.61
19.3	58.964	144	28.08	33.954	217	63.54	4.724	161	58.87	24.527	137	6.03
Mar. 1.3	58.820	170	28.18	33.737	250	64.41	4.563	181	59.89	24.390	160	5.60
11.3	58.650	181	28.25	33.487	268	64.97	4.382	193	60.58	24.230	171	5.33
21.3	58.469	182	28.27	33.219	254	65.21	4.189	185	60.92	24.059	173	5.18
31.2	58.287	172	28.23	32.950	225	65.12	3.995	167	60.93	23.886	163	5.17
Apr. 10.2	58.115	153	28.13	32.696	229	64.72	3.810	142	60.61	23.723	146	5.28
20.2	57.962	123	27.99	32.467	190	64.00	3.643	110	59.97	23.577	119	5.53
30.2	57.839	88	27.81	32.277	140	63.02	3.501	73	59.03	23.458	87	5.89
May 10.1	57.751	49	27.61	32.137	86	61.80	3.391	34	57.80	23.371	51	6.37
20.1	57.702	5	27.41	32.061	25	60.41	3.318	172	56.32	23.320	12	6.98
30.1	57.697	39	27.23	32.026	35	58.90	3.284	189	54.60	23.308	29	7.71
June 9.0	57.736	82	27.08	32.061	97	57.30	3.291	7	52.71	23.337	69	8.53
19.0	57.818	123	26.96	32.158	155	55.68	3.338	87	50.68	23.406	106	9.44
29.0	57.941	161	26.89	32.313	209	54.07	3.425	125	48.56	23.512	141	10.41
July 9.0	58.102	195	26.85	32.522	258	52.52	3.550	159	46.42	23.653	174	11.40
18.9	58.297	226	26.85	32.780	303	51.06	3.709	189	44.33	23.827	202	12.39
28.9	58.523	251	26.87	33.083	341	49.71	3.898	218	42.34	24.029	226	13.34
Aug. 7.9	58.774	272	26.89	33.424	371	48.50	4.116	240	40.52	24.255	246	14.21
17.9	59.046	290	26.90	33.795	399	47.44	4.356	260	38.97	24.501	264	14.94
27.8	59.336	304	26.87	34.194	418	46.54	4.616	275	37.72	24.765	276	15.52
Sept. 6.8	59.640	313	26.80	34.612	433	45.83	4.891	286	36.84	25.041	285	15.89
16.8	59.953	319	26.66	35.045	443	45.29	5.177	293	36.36	25.327	292	16.02
26.7	60.272	322	26.44	35.488	447	44.93	5.470	296	36.34	25.619	296	15.92
Oct. 6.7	60.594	322	26.15	35.935	443	44.78	5.766	288	36.77	25.915	289	15.55
16.7	60.916	316	25.80	36.378	436	44.83	6.061	276	37.65	26.209	276	14.93
26.7	61.232	305	25.40	36.814	420	45.10	6.349	276	38.97	26.498	276	14.08
Nov. 5.6	61.537	289	24.97	37.234	394	45.57	6.625	256	40.68	26.778	264	13.04
15.6	61.826	267	24.53	37.628	361	46.26	6.881	233	42.71	27.042	243	11.83
25.6	62.093	238	24.11	37.989	318	47.17	7.114	202	44.99	27.285	215	10.51
Dec. 5.6	62.331	200	23.73	38.307	266	48.28	7.316	164	47.44	27.500	180	9.15
15.5	62.531	158	23.43	38.573	206	49.55	7.480	122	49.98	27.680	142	7.78
25.5	62.689	110	23.22	38.779	138	50.96	7.602	70	52.53	27.822	97	6.45
35.5	62.799		23.10	38.917		52.47	7.678		54.99	27.919		5.21
Mean Place	56.386		26.30	30.538		54.02	2.655		49.68	22.225		9.54
Sec $\delta$ , Tan $\delta$	1.083		+0.415	1.534		+1.164	1.051		-0.323	1.003		+0.081
$D\psi\alpha$ , $D\omega\alpha$	+0.07		0.00	+0.09		+0.01	+0.05		0.00	+0.06		0.00
$D\psi\delta$ , $D\omega\delta$	0.0		+1.0	0.0		+1.0	0.0		+1.0	0.0		+1.0



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Argus. (Canopus.) Mag. -0.9		10 Monocerotis. Mag. 5.0		$\gamma$ Geminorum. Mag. 4.1		$\delta$ Lynceis. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 22	° ' " -52 38	h m 6 23	° ' " - 4 42	h m 6 24	° ' " +20 15	h m 6 30	° ' " +61 33
	s	"	s	"	s	"	s	"
Jan. 0.5	9.218	59.91	54.054	35.02	4.729	57.84	11.32	22.60
10.5	9.197	63.41	54.121	36.74	4.817	57.63	11.45	24.76
20.4	9.103	66.69	54.141	38.29	4.853	57.49	11.48	26.91
30.4	8.943	69.65	54.114	39.65	4.837	57.44	11.42	28.96
Feb. 9.4	8.722	72.22	54.042	40.80	4.774	57.44	11.25	30.83
19.4	8.450	74.35	53.932	41.74	4.669	57.48	11.01	32.43
Mar. 1.3	8.137	76.00	53.792	42.43	4.531	57.53	10.71	33.69
11.3	7.795	77.13	53.628	42.91	4.366	57.58	10.36	34.56
21.3	7.437	77.74	53.454	43.15	4.188	57.60	9.98	35.03
31.2	7.078	77.83	53.277	43.17	4.008	57.59	9.59	35.04
Apr. 10.2	6.730	77.40	53.109	42.97	3.838	57.55	9.22	34.62
20.2	6.403	76.46	52.957	42.57	3.685	57.47	8.88	33.78
30.2	6.109	75.06	52.831	41.97	3.560	57.39	8.58	32.56
May 10.1	5.857	73.22	52.735	41.16	3.468	57.29	8.35	31.01
20.1	5.654	70.98	52.675	40.18	3.416	57.21	8.20	29.21
30.1	5.506	68.41	52.653	39.03	3.405	57.15	8.11	27.20
June 9.1	5.417	65.57	52.672	37.76	3.437	57.11	8.11	25.03
19.0	5.388	62.52	52.729	36.37	3.512	57.12	8.19	22.79
29.0	5.419	59.37	52.823	34.91	3.627	57.16	8.35	20.54
July 9.0	5.512	56.18	52.953	33.42	3.779	57.24	8.58	18.32
18.9	5.662	53.06	53.115	31.95	3.965	57.34	8.90	16.20
28.9	5.867	50.10	53.306	30.55	4.182	57.45	9.27	14.20
Aug. 7.9	6.123	47.39	53.523	29.28	4.424	57.55	9.69	12.38
17.9	6.423	45.02	53.761	28.19	4.688	57.62	10.16	10.77
27.8	6.761	43.10	54.017	27.32	4.969	57.64	10.67	9.37
Sept. 6.8	7.130	41.70	54.286	26.73	5.265	57.58	11.22	8.24
16.8	7.523	40.86	54.567	26.46	5.573	57.44	11.79	7.37
26.8	7.929	40.63	54.855	26.51	5.886	57.20	12.37	6.80
Oct. 6.7	8.340	41.06	55.146	26.91	6.203	56.87	12.96	6.53
16.7	8.746	42.12	55.437	27.65	6.521	56.44	13.55	6.56
26.7	9.135	43.80	55.723	28.71	6.834	55.94	14.14	6.92
Nov. 5.6	9.498	46.04	56.000	30.05	7.136	55.39	14.70	7.61
15.6	9.826	48.78	56.261	31.63	7.425	54.82	15.23	8.60
25.6	10.105	51.92	56.501	33.38	7.691	54.25	15.71	9.91
Dec. 5.6	10.330	55.35	56.712	35.24	7.930	53.71	16.14	11.50
15.5	10.492	58.96	56.890	37.14	8.132	53.24	16.50	13.31
25.5	10.585	62.62	57.027	39.02	8.294	52.86	16.77	15.31
35.5	10.609	66.22	57.121	40.82	8.408	52.58	16.95	17.45
Mean Place	6.565	60.04	51.718	35.53	2.105	56.75	6.605	20.84
Sec $\delta$ , Tan $\delta$	1.648	-1.310	1.003	-0.082	1.066	+0.369	2.099	+1.846
$D\psi\alpha$ , $D\omega\alpha$	+0.03	-0.01	+0.06	0.00	+0.07	0.00	+0.11	+0.02
$D\psi\delta$ , $D\omega\delta$	0.0	+1.0	0.0	+1.0	0.0	+1.0	-0.1	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\xi^2$ Canis Majoris. Mag. 4.5			23 H. Camelop. Mag. 5.6			51 Aurigæ. Mag. 5.7			$\gamma$ Geminorum. Mag. 1.9		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	6	31	-22 53	6	32	+79 39	6	32	+39 27	6	32	+16 28
	s		"	s		"	s		"	s		"
Jan. 0.5	36.979	56	51.59	16.68	19	27.96	57.687	110	55.71	57.628	93	16.58
10.5	37.035	4	54.23	16.87	6	30.87	57.797	48	56.65	57.721	43	16.10
20.4	37.039	45	56.70	16.81	29	33.73	57.845	14	57.65	57.764	8	15.72
30.4	36.994	91	58.91	16.52	54	36.44	57.831	72	58.64	57.756	56	15.46
Feb. 9.4	36.903	131	60.83	15.98	73	38.88	57.759	125	59.59	57.700	97	15.28
19.4	36.772	165	62.41	15.25	89	40.96	57.634	168	60.43	57.603	133	15.18
Mar. 1.3	36.607	187	63.63	14.36	102	42.59	57.466	198	61.12	57.470	158	15.13
11.3	36.420	201	64.48	13.34	109	43.72	57.268	219	61.62	57.312	172	15.11
21.3	36.219	204	64.97	12.25	111	44.30	57.049	222	61.89	57.140	176	15.11
31.2	36.015	197	65.06	11.14	108	44.29	56.827	213	61.94	56.964	169	15.12
Apr. 10.2	35.818	181	64.80	10.06	100	43.73	56.614	194	61.75	56.795	152	15.14
20.2	35.637	157	64.18	9.06	89	42.63	56.420	162	61.35	56.643	126	15.16
30.2	35.480	126	63.22	8.17	75	41.05	56.258	122	60.75	56.517	96	15.20
May 10.1	35.354	91	61.94	7.42	56	39.03	56.136	77	59.96	56.421	57	15.25
20.1	35.263	52	60.37	6.86	37	36.67	56.059	28	59.05	56.364	18	15.34
30.1	35.211	11	58.56	6.49	17	34.01	56.031	22	58.04	56.346	23	15.47
June 9.1	35.200	30	56.52	6.32	6	31.17	56.053	74	56.97	56.369	64	15.63
19.0	35.230	70	54.34	6.38	25	28.21	56.127	123	55.86	56.433	104	15.84
29.0	35.300	109	52.05	6.63	47	25.22	56.250	169	54.76	56.537	139	16.10
July 9.0	35.409	144	49.73	7.10	66	22.26	56.419	211	53.69	56.676	174	16.37
18.9	35.553	178	47.44	7.76	84	19.41	56.630	248	52.66	56.850	203	16.65
28.9	35.731	208	45.27	8.60	99	16.75	56.878	280	51.69	57.053	229	16.92
Aug. 7.9	35.939	233	43.27	9.59	113	14.31	57.158	309	50.80	57.282	252	17.15
17.9	36.172	256	41.54	10.72	125	12.16	57.467	332	49.99	57.534	270	17.34
27.8	36.428	274	40.12	11.97	136	10.32	57.799	351	49.27	57.804	284	17.44
Sept. 6.8	36.702	287	39.09	13.33	142	8.85	58.150	365	48.62	58.088	296	17.43
16.8	36.989	297	38.51	14.75	147	7.76	58.515	376	48.05	58.384	306	17.31
26.8	37.286	303	38.40	16.22	149	7.08	58.891	382	47.58	58.690	310	17.03
Oct. 6.7	37.589	303	38.79	17.71	149	6.83	59.273	383	47.21	59.000	312	16.63
16.7	37.892	297	39.67	19.20	145	7.02	59.656	379	46.96	59.312	309	16.11
26.7	38.189	287	41.03	20.65	137	7.66	60.035	369	46.82	59.621	300	15.46
Nov. 5.6	38.476	268	42.81	22.02	129	8.73	60.404	351	46.81	59.921	288	14.72
15.6	38.744	245	44.97	23.31	116	10.24	60.755	327	46.95	60.209	267	13.94
25.6	38.989	213	47.41	24.47	99	12.13	61.082	293	47.26	60.476	241	13.13
Dec. 5.6	39.202	175	50.08	25.46	79	14.38	61.375	251	47.72	60.717	206	12.34
15.5	39.377	131	52.85	26.25	58	16.93	61.626	200	48.35	60.923	166	11.62
25.5	39.508	85	55.65	26.83	33	19.68	61.826	144	49.13	61.089	120	10.96
35.5	39.593		58.38	27.16		22.56	61.970		50.01	61.209		10.41
Mean Place	34.686		51.86	5.571		25.93	54.535		54.79	55.063		16.07
Sec $\delta$ , Tan $\delta$	1.086		-0.422	5.570		+5.479	1.295		+0.823	1.043		+0.296
$D\alpha$ , $D\alpha$	+0.05		0.00	+0.20		+0.05	+0.08		+0.01	+0.07		0.00
$D\delta$ , $D\delta$	-0.1		+1.0	-0.1		+1.0	-0.1		+1.0	-0.1		+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Argus. Mag. 3.2			δ Monocerotis. Mag. 4.7			ε Geminorum. Mag. 3.2			ξ Geminorum. Mag. 3.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	° '		h m	° '		h m	° '		h m	° '	
	6 35	-43 7		6 36	+ 9 58		6 38	+25 12		6 40	+12 59	
	s	"		s	"		s	"		s	"	
Jan. 0.5	15.825	21.06		26.918	24.77		52.322	52.19		40.411	10.10	
10.5	15.851	24.44	338	27.009	23.88	89	52.428	52.24	5	40.508	9.38	72
20.4	15.815	27.61	317	27.051	23.12	76	52.481	52.39	15	40.556	8.78	60
30.4	15.719	30.50	289	27.044	22.49	63	52.478	52.62	23	40.554	8.31	47
Feb. 9.4	15.570	33.03	253	26.991	21.99	50	52.425	52.89	27	40.504	7.95	36
	197	213		94	37		99	28		92	24	
19.4	15.373	35.16		26.897	21.62		52.326	53.17		40.412	7.71	17
Mar. 1.3	15.138	36.84	168	26.768	21.36	26	52.190	53.42	25	40.285	7.54	9
	235	120		154	16		164	21		153	4	
11.3	14.875	38.04	72	26.614	21.20	8	52.026	53.63	15	40.132	7.45	4
21.3	14.597	38.76	22	26.445	21.12	0	51.845	53.78	6	39.962	7.41	2
31.3	14.314	38.98	26	26.273	21.12	6	51.659	53.84	3	39.789	7.43	5
	277			166			180			168		
Apr. 10.2	14.037	38.72		26.107	21.18		51.479	53.81		39.621	7.48	
20.2	13.778	37.99	73	25.956	21.32	14	51.316	53.70	11	39.468	7.57	9
30.2	13.545	36.80	119	25.830	21.55	23	51.178	53.52	18	39.340	7.70	13
May 10.1	13.347	35.19	161	25.734	21.83	28	51.075	53.27	25	39.241	7.88	18
20.1	13.189	33.20	199	25.674	22.19	36	51.010	52.99	28	39.178	8.12	24
	111	230		22	44		24	30		25	29	
30.1	13.078	30.90		25.652	22.63		50.986	52.69		39.153	8.41	
June 9.1	13.014	28.31	259	25.669	23.14	51	51.006	52.38	31	39.168	8.74	33
	14	25.52	279	25.726	23.70	56	51.068	52.08	30	39.223	9.13	39
19.0	13.000	22.59	293	25.821	24.31	61	51.173	51.80	27	39.315	9.55	42
29.0	13.037	19.82	297	25.952	24.95	64	51.315	51.53	27	39.445	10.00	45
July 9.0	13.123	16.68	294	26.115	25.59	61	51.494	51.30	23	39.608	10.45	45
	133	13.86	282	26.307	26.20	61	51.705	51.07	23	39.799	10.87	42
19.0	13.256	11.28	258	26.526	26.75	55	51.943	50.84	23	40.017	11.25	38
Aug. 7.9	13.654	9.00	228	26.766	27.21	46	52.206	50.59	25	40.258	11.55	30
	256	7.12	188	27.025	27.54	33	52.488	50.33	26	40.518	11.73	18
17.9	13.910		141			15			30	275	5	
27.8	14.197	5.71	87	27.299	27.69		52.788	50.03	30	40.793	11.78	5
Sept. 6.8	14.512	4.84	29	27.585	27.68	1	53.101	49.68	35	41.081	11.68	10
	335	4.55	29	27.880	27.46	22	53.423	49.29	39	41.379	11.41	27
16.8	14.847	4.86	31	28.181	27.04	42	53.751	48.86	43	41.684	10.98	43
Oct. 6.7	15.554	5.80	94	28.484	26.42	62	54.083	48.38	48	41.991	10.36	62
	357	7.32	152	28.784	25.63	79	54.412	47.88	50	42.295	9.59	77
16.7	15.910	9.39	207	29.077	24.68	95	54.734	47.38	50	42.593	8.71	88
26.7	16.256	11.94	255	29.358	23.62	106	55.042	46.90	48	42.881	7.74	97
Nov. 5.7	16.587	14.89	295	29.618	22.50	112	55.330	46.48	42	43.148	6.72	102
	304	18.12	323	29.854	21.35	115	55.590	46.13	35	43.390	5.71	101
15.6	16.891	21.54	342	30.056	20.22	113	55.815	45.90	23	43.599	4.73	96
25.6	17.161	25.04	350	30.218	19.15	107	55.998	45.77	13	43.768	3.83	90
Dec. 5.6	17.389	28.49	345	30.336	18.19	96	56.132	45.75	2	43.892	3.03	80
	178											
15.5	17.567											
25.5	17.689											
35.5	17.751											
Mean Place	13.382	21.57		24.445	24.51		49.590	51.95		37.896	10.03	
Sec δ, Tan δ	1.370	-0.937		1.015	+0.176		1.105	+0.471		1.026	+0.231	
Dψ α, Dα α	+0.04	-0.01		+0.07	0.00		+0.07	+0.01		+0.07	0.00	
Dψ δ, Dα δ	-0.1	+1.0		-0.1	+1.0		-0.1	+1.0		-0.1	+1.0	



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\psi^5$ Aurigæ. Mag. 5.3		$\alpha$ Canis Majoris. (Sirius.) Mag. -1.6		18 Monocerotis. Mag. 4.7		43 Camelop. Mag. 5.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 40	° ' " +43 39	h m 6 41	° ' " -16 35	h m 6 43	° ' " + 2 30	h m 6 44	° ' " +68 58
	s	"	s	"	s	"	s	"
Jan. 0.5	48.952 <sup>125</sup>	41.00 <sup>119</sup>	31.581 <sup>07</sup>	65.99 <sup>243</sup>	34.356 <sup>92</sup>	14.19 <sup>137</sup>	51.86 <sup>18</sup>	72.53 <sup>249</sup>
10.5	49.077 <sup>58</sup>	42.19 <sup>123</sup>	31.648 <sup>18</sup>	68.42 <sup>225</sup>	34.448 <sup>44</sup>	12.82 <sup>121</sup>	52.04 <sup>5</sup>	75.02 <sup>250</sup>
20.4	49.135 <sup>9</sup>	43.42 <sup>124</sup>	31.666 <sup>31</sup>	70.67 <sup>200</sup>	34.492 <sup>5</sup>	11.61 <sup>105</sup>	52.09 <sup>7</sup>	77.52 <sup>240</sup>
30.4	49.126 <sup>71</sup>	44.66 <sup>117</sup>	31.635 <sup>76</sup>	72.67 <sup>174</sup>	34.487 <sup>51</sup>	10.56 <sup>88</sup>	52.02 <sup>21</sup>	79.92 <sup>223</sup>
Feb. 9.4	49.055 <sup>128</sup>	45.83 <sup>106</sup>	31.559 <sup>117</sup>	74.41 <sup>145</sup>	34.436 <sup>91</sup>	9.68 <sup>69</sup>	51.81 <sup>30</sup>	82.15 <sup>195</sup>
19.4	48.927 <sup>175</sup>	46.89 <sup>88</sup>	31.442 <sup>150</sup>	75.86 <sup>111</sup>	34.345 <sup>127</sup>	8.99 <sup>52</sup>	51.51 <sup>39</sup>	84.10 <sup>159</sup>
Mar. 1.3	48.752 <sup>210</sup>	47.77 <sup>65</sup>	31.292 <sup>174</sup>	76.97 <sup>79</sup>	34.218 <sup>151</sup>	8.47 <sup>36</sup>	51.12 <sup>47</sup>	85.69 <sup>115</sup>
11.3	48.542 <sup>231</sup>	48.42 <sup>40</sup>	31.118 <sup>187</sup>	77.76 <sup>47</sup>	34.067 <sup>168</sup>	8.11 <sup>18</sup>	50.65 <sup>51</sup>	86.84 <sup>70</sup>
21.3	48.311 <sup>239</sup>	48.82 <sup>13</sup>	30.931 <sup>192</sup>	78.23 <sup>14</sup>	33.899 <sup>171</sup>	7.93 <sup>4</sup>	50.14 <sup>53</sup>	87.54 <sup>20</sup>
31.3	48.072 <sup>232</sup>	48.95 <sup>15</sup>	30.739 <sup>186</sup>	78.37 <sup>19</sup>	33.728 <sup>167</sup>	7.89 <sup>11</sup>	49.61 <sup>51</sup>	87.74 <sup>29</sup>
Apr. 10.2	47.840 <sup>212</sup>	48.80 <sup>40</sup>	30.553 <sup>170</sup>	78.18 <sup>48</sup>	33.561 <sup>153</sup>	8.00 <sup>26</sup>	49.10 <sup>48</sup>	87.45 <sup>78</sup>
20.2	47.628 <sup>181</sup>	48.40 <sup>67</sup>	30.383 <sup>148</sup>	77.70 <sup>79</sup>	33.408 <sup>130</sup>	8.26 <sup>38</sup>	48.62 <sup>44</sup>	86.67 <sup>122</sup>
30.2	47.447 <sup>141</sup>	47.73 <sup>86</sup>	30.235 <sup>118</sup>	76.91 <sup>106</sup>	33.278 <sup>102</sup>	8.64 <sup>52</sup>	48.18 <sup>36</sup>	85.45 <sup>162</sup>
May 10.1	47.306 <sup>94</sup>	46.87 <sup>104</sup>	30.117 <sup>84</sup>	75.85 <sup>131</sup>	33.176 <sup>67</sup>	9.16 <sup>66</sup>	47.82 <sup>27</sup>	83.83 <sup>195</sup>
20.1	47.212 <sup>42</sup>	45.83 <sup>119</sup>	30.033 <sup>47</sup>	74.54 <sup>152</sup>	33.109 <sup>31</sup>	9.82 <sup>77</sup>	47.55 <sup>16</sup>	81.88 <sup>222</sup>
30.1	47.170 <sup>11</sup>	44.64 <sup>127</sup>	29.986 <sup>7</sup>	73.02 <sup>172</sup>	33.078 <sup>7</sup>	10.59 <sup>87</sup>	47.39 <sup>6</sup>	79.66 <sup>243</sup>
June 9.1	47.181 <sup>65</sup>	43.37 <sup>133</sup>	29.979 <sup>32</sup>	71.30 <sup>186</sup>	33.085 <sup>45</sup>	11.46 <sup>95</sup>	47.33 <sup>3</sup>	77.24 <sup>253</sup>
19.0	47.246 <sup>117</sup>	42.04 <sup>135</sup>	30.011 <sup>71</sup>	69.44 <sup>195</sup>	33.130 <sup>83</sup>	12.41 <sup>101</sup>	47.36 <sup>15</sup>	74.71 <sup>261</sup>
29.0	47.363 <sup>167</sup>	40.69 <sup>132</sup>	30.082 <sup>108</sup>	67.49 <sup>197</sup>	33.213 <sup>118</sup>	13.42 <sup>104</sup>	47.51 <sup>25</sup>	72.10 <sup>259</sup>
July 9.0	47.530 <sup>212</sup>	39.37 <sup>129</sup>	30.190 <sup>142</sup>	65.52 <sup>195</sup>	33.331 <sup>151</sup>	14.46 <sup>103</sup>	47.76 <sup>34</sup>	69.51 <sup>251</sup>
19.0	47.742 <sup>253</sup>	38.08 <sup>122</sup>	30.332 <sup>174</sup>	63.57 <sup>186</sup>	33.482 <sup>179</sup>	15.49 <sup>99</sup>	48.10 <sup>43</sup>	67.00 <sup>240</sup>
28.9	47.995 <sup>288</sup>	36.86 <sup>114</sup>	30.506 <sup>203</sup>	61.71 <sup>160</sup>	33.661 <sup>206</sup>	16.48 <sup>89</sup>	48.53 <sup>51</sup>	64.60 <sup>223</sup>
Aug. 7.9	48.283 <sup>320</sup>	35.72 <sup>106</sup>	30.709 <sup>226</sup>	60.02 <sup>147</sup>	33.867 <sup>228</sup>	17.37 <sup>75</sup>	49.04 <sup>58</sup>	62.37 <sup>200</sup>
17.9	48.603 <sup>347</sup>	34.66 <sup>94</sup>	30.935 <sup>247</sup>	58.55 <sup>117</sup>	34.095 <sup>247</sup>	18.12 <sup>58</sup>	49.62 <sup>64</sup>	60.37 <sup>174</sup>
27.8	48.950 <sup>366</sup>	33.72 <sup>83</sup>	31.182 <sup>265</sup>	57.38 <sup>82</sup>	34.342 <sup>265</sup>	18.70 <sup>36</sup>	50.26 <sup>68</sup>	58.63 <sup>148</sup>
Sept. 6.8	49.316 <sup>384</sup>	32.89 <sup>71</sup>	31.447 <sup>279</sup>	56.56 <sup>43</sup>	34.607 <sup>277</sup>	19.06 <sup>11</sup>	50.94 <sup>73</sup>	57.15 <sup>117</sup>
16.8	49.700 <sup>397</sup>	32.18 <sup>59</sup>	31.726 <sup>288</sup>	56.13 <sup>1</sup>	34.884 <sup>287</sup>	19.17 <sup>15</sup>	51.67 <sup>76</sup>	55.98 <sup>82</sup>
26.8	50.097 <sup>405</sup>	31.59 <sup>45</sup>	32.014 <sup>295</sup>	56.12 <sup>45</sup>	35.171 <sup>294</sup>	19.02 <sup>43</sup>	52.43 <sup>77</sup>	55.16 <sup>46</sup>
Oct. 6.7	50.502 <sup>407</sup>	31.14 <sup>28</sup>	32.309 <sup>293</sup>	56.57 <sup>89</sup>	35.465 <sup>297</sup>	18.59 <sup>71</sup>	53.20 <sup>78</sup>	54.70 <sup>11</sup>
16.7	50.909 <sup>404</sup>	30.86 <sup>14</sup>	32.605 <sup>296</sup>	57.46 <sup>131</sup>	35.762 <sup>295</sup>	17.88 <sup>95</sup>	53.98 <sup>76</sup>	54.59 <sup>29</sup>
26.7	51.313 <sup>394</sup>	30.72 <sup>5</sup>	32.898 <sup>284</sup>	58.77 <sup>170</sup>	36.057 <sup>289</sup>	16.93 <sup>118</sup>	54.74 <sup>73</sup>	54.88 <sup>68</sup>
Nov. 5.7	51.707 <sup>378</sup>	30.77 <sup>24</sup>	33.182 <sup>267</sup>	60.47 <sup>204</sup>	36.346 <sup>277</sup>	15.75 <sup>136</sup>	55.47 <sup>70</sup>	55.56 <sup>105</sup>
15.6	52.085 <sup>351</sup>	31.01 <sup>42</sup>	33.449 <sup>246</sup>	62.51 <sup>229</sup>	36.623 <sup>258</sup>	14.39 <sup>148</sup>	56.17 <sup>65</sup>	56.61 <sup>141</sup>
25.6	52.436 <sup>316</sup>	31.43 <sup>64</sup>	33.695 <sup>217</sup>	64.80 <sup>246</sup>	36.881 <sup>234</sup>	12.91 <sup>156</sup>	56.82 <sup>57</sup>	58.02 <sup>176</sup>
Dec. 5.6	52.752 <sup>272</sup>	32.07 <sup>81</sup>	33.912 <sup>182</sup>	67.26 <sup>258</sup>	37.115 <sup>201</sup>	11.35 <sup>158</sup>	57.39 <sup>48</sup>	59.78 <sup>205</sup>
15.5	53.024 <sup>219</sup>	32.88 <sup>99</sup>	34.094 <sup>141</sup>	69.84 <sup>257</sup>	37.316 <sup>162</sup>	9.77 <sup>153</sup>	57.87 <sup>37</sup>	61.83 <sup>226</sup>
25.5	53.243 <sup>161</sup>	33.87 <sup>111</sup>	34.235 <sup>95</sup>	72.41 <sup>251</sup>	37.478 <sup>118</sup>	8.24 <sup>144</sup>	58.24 <sup>24</sup>	64.09 <sup>244</sup>
35.5	53.404	34.98	34.330	74.92	37.596	6.80	58.48	66.53
Mean Place	45.621	40.70	29.433	65.39	31.963	14.20	45.850	72.22
Sec $\delta$ , Tan $\delta$	1.382	+0.954	1.044	-0.298	1.001	+0.044	2.788	+2.603
$D\psi\alpha$ , $D\omega\alpha$	+0.09	+0.01	+0.05	0.00	+0.06	0.00	+0.13	+0.03
$D\psi\delta$ , $D\omega\delta$	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Geminorum. Mag. 3.6		$\alpha$ Pictoris. Mag. 3.3		$\tau$ Argus. Mag. 2.8		15 Lynceis. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 6 47	° ' " +34 3	h m 6 47	° ' " -61 50	h m 6 47	° ' " -50 30	h m 6 50	° ' " +58 31
	s	"	s	"	s	"	s	"
Jan. 0.5	22.212 <sup>123</sup>	44.67 <sup>59</sup>	23.50 <sup>2</sup>	66.50 <sup>372</sup>	55.166 <sup>26</sup>	55.23 <sup>359</sup>	10.180 <sup>162</sup>	58.69 <sup>198</sup>
10.5	22.335 <sup>65</sup>	45.26 <sup>67</sup>	23.48 <sup>11</sup>	70.22 <sup>354</sup>	55.192 <sup>45</sup>	58.82 <sup>341</sup>	10.342 <sup>70</sup>	60.67 <sup>202</sup>
20.5	22.400 <sup>5</sup>	45.93 <sup>73</sup>	23.37 <sup>20</sup>	73.76 <sup>329</sup>	55.147 <sup>112</sup>	62.23 <sup>315</sup>	10.412 <sup>21</sup>	62.69 <sup>199</sup>
30.4	22.405 <sup>53</sup>	46.66 <sup>73</sup>	23.17 <sup>27</sup>	77.05 <sup>292</sup>	55.035 <sup>173</sup>	65.38 <sup>280</sup>	10.391 <sup>107</sup>	64.68 <sup>187</sup>
Feb. 9.4	22.352 <sup>102</sup>	47.39 <sup>68</sup>	22.90 <sup>34</sup>	79.97 <sup>252</sup>	54.862 <sup>228</sup>	68.18 <sup>239</sup>	10.284 <sup>185</sup>	66.55 <sup>165</sup>
19.4	22.250	48.07 <sup>60</sup>	22.56 <sup>40</sup>	82.49 <sup>204</sup>	54.634 <sup>273</sup>	70.57 <sup>194</sup>	10.099 <sup>250</sup>	68.20 <sup>139</sup>
Mar. 1.3	22.106 <sup>144</sup>	48.67 <sup>48</sup>	22.16 <sup>44</sup>	84.53 <sup>154</sup>	54.361 <sup>307</sup>	72.51 <sup>145</sup>	9.849 <sup>301</sup>	69.59 <sup>104</sup>
11.3	21.929 <sup>177</sup>	49.15 <sup>30</sup>	21.72 <sup>47</sup>	86.07 <sup>102</sup>	54.054 <sup>326</sup>	73.96 <sup>93</sup>	9.548 <sup>332</sup>	70.63 <sup>65</sup>
21.3	21.732 <sup>197</sup>	49.45 <sup>15</sup>	21.25 <sup>48</sup>	87.09 <sup>47</sup>	53.728 <sup>335</sup>	74.89 <sup>43</sup>	9.216 <sup>345</sup>	71.28 <sup>24</sup>
31.3	21.528 <sup>199</sup>	49.60 <sup>4</sup>	20.77 <sup>48</sup>	87.56 <sup>5</sup>	53.393 <sup>331</sup>	75.32 <sup>8</sup>	8.871 <sup>341</sup>	71.52 <sup>17</sup>
Apr. 10.2	21.329 <sup>183</sup>	49.56 <sup>21</sup>	20.29 <sup>45</sup>	87.51 <sup>58</sup>	53.062 <sup>314</sup>	75.24 <sup>59</sup>	8.530 <sup>316</sup>	71.35 <sup>57</sup>
20.2	21.146 <sup>156</sup>	49.35 <sup>37</sup>	19.84 <sup>43</sup>	86.93 <sup>109</sup>	52.748 <sup>289</sup>	74.65 <sup>108</sup>	8.214 <sup>279</sup>	70.78 <sup>94</sup>
30.2	20.990 <sup>122</sup>	48.98 <sup>62</sup>	19.41 <sup>38</sup>	85.84 <sup>157</sup>	52.459 <sup>253</sup>	73.57 <sup>152</sup>	7.935 <sup>228</sup>	69.84 <sup>128</sup>
May 10.2	20.868 <sup>81</sup>	48.46 <sup>52</sup>	19.03 <sup>32</sup>	84.27 <sup>200</sup>	52.206 <sup>162</sup>	72.05 <sup>195</sup>	7.707 <sup>167</sup>	68.56 <sup>157</sup>
20.1	20.787 <sup>36</sup>	47.84 <sup>73</sup>	18.71 <sup>26</sup>	82.27 <sup>238</sup>	51.994 <sup>212</sup>	70.10 <sup>229</sup>	7.540 <sup>99</sup>	66.99 <sup>179</sup>
30.1	20.751 <sup>10</sup>	47.11 <sup>77</sup>	18.45 <sup>20</sup>	79.89 <sup>272</sup>	51.832 <sup>109</sup>	67.81 <sup>261</sup>	7.441 <sup>28</sup>	65.20 <sup>197</sup>
June 9.1	20.761 <sup>56</sup>	46.34 <sup>81</sup>	18.25 <sup>13</sup>	77.17 <sup>298</sup>	51.723 <sup>55</sup>	65.20 <sup>285</sup>	7.413 <sup>46</sup>	63.23 <sup>208</sup>
19.0	20.817 <sup>102</sup>	45.53 <sup>82</sup>	18.12 <sup>4</sup>	74.19 <sup>314</sup>	51.668 <sup>3</sup>	62.35 <sup>302</sup>	7.459 <sup>117</sup>	61.15 <sup>214</sup>
29.0	20.919 <sup>144</sup>	44.71 <sup>81</sup>	18.08 <sup>4</sup>	71.05 <sup>323</sup>	51.671 <sup>59</sup>	59.33 <sup>309</sup>	7.576 <sup>187</sup>	59.01 <sup>214</sup>
July 9.0	21.063 <sup>183</sup>	43.90 <sup>79</sup>	18.12 <sup>11</sup>	67.82 <sup>322</sup>	51.730 <sup>115</sup>	56.24 <sup>307</sup>	7.763 <sup>251</sup>	56.87 <sup>209</sup>
19.0	21.246 <sup>220</sup>	43.11 <sup>76</sup>	18.23 <sup>18</sup>	64.60 <sup>312</sup>	51.845 <sup>167</sup>	53.17 <sup>298</sup>	8.014 <sup>310</sup>	54.78 <sup>201</sup>
28.9	21.466 <sup>251</sup>	42.35 <sup>74</sup>	18.41 <sup>25</sup>	61.48 <sup>292</sup>	52.012 <sup>217</sup>	50.19 <sup>277</sup>	8.324 <sup>363</sup>	52.77 <sup>189</sup>
Aug. 7.9	21.717 <sup>277</sup>	41.61 <sup>68</sup>	18.66 <sup>32</sup>	58.56 <sup>260</sup>	52.229 <sup>264</sup>	47.42 <sup>247</sup>	8.687 <sup>410</sup>	50.88 <sup>173</sup>
17.9	21.994 <sup>302</sup>	40.93 <sup>67</sup>	18.98 <sup>38</sup>	55.96 <sup>221</sup>	52.493 <sup>304</sup>	44.95 <sup>208</sup>	9.097 <sup>450</sup>	49.15 <sup>154</sup>
27.9	22.296 <sup>320</sup>	40.26 <sup>63</sup>	19.36 <sup>43</sup>	53.75 <sup>173</sup>	52.797 <sup>338</sup>	42.87 <sup>160</sup>	9.547 <sup>483</sup>	47.61 <sup>133</sup>
Sept. 6.8	22.616 <sup>335</sup>	39.63 <sup>60</sup>	19.79 <sup>47</sup>	52.02 <sup>116</sup>	53.135 <sup>365</sup>	41.27 <sup>106</sup>	10.030 <sup>511</sup>	46.28 <sup>109</sup>
16.8	22.951 <sup>349</sup>	39.03 <sup>57</sup>	20.26 <sup>49</sup>	50.86 <sup>55</sup>	53.500 <sup>386</sup>	40.21 <sup>46</sup>	10.541 <sup>529</sup>	45.19 <sup>85</sup>
26.8	23.300 <sup>357</sup>	38.46 <sup>53</sup>	20.75 <sup>51</sup>	50.31 <sup>11</sup>	53.886 <sup>397</sup>	39.75 <sup>16</sup>	11.070 <sup>543</sup>	44.34 <sup>57</sup>
Oct. 6.7	23.657 <sup>360</sup>	37.93 <sup>47</sup>	21.26 <sup>51</sup>	50.42 <sup>77</sup>	54.283 <sup>398</sup>	39.91 <sup>80</sup>	11.613 <sup>549</sup>	43.77 <sup>28</sup>
16.7	24.017 <sup>360</sup>	37.46 <sup>40</sup>	21.77 <sup>49</sup>	51.19 <sup>142</sup>	54.681 <sup>392</sup>	40.71 <sup>145</sup>	12.162 <sup>545</sup>	43.49 <sup>2</sup>
26.7	24.377 <sup>352</sup>	37.06 <sup>31</sup>	22.26 <sup>47</sup>	52.61 <sup>202</sup>	55.073 <sup>373</sup>	42.16 <sup>202</sup>	12.707 <sup>532</sup>	43.51 <sup>33</sup>
Nov. 5.7	24.729 <sup>340</sup>	36.75 <sup>20</sup>	22.73 <sup>43</sup>	54.63 <sup>258</sup>	55.446 <sup>344</sup>	44.18 <sup>254</sup>	13.239 <sup>508</sup>	43.84 <sup>66</sup>
15.6	25.069 <sup>318</sup>	36.55 <sup>7</sup>	23.16 <sup>36</sup>	57.21 <sup>304</sup>	55.790 <sup>306</sup>	46.72 <sup>299</sup>	13.747 <sup>473</sup>	44.50 <sup>95</sup>
25.6	25.387 <sup>290</sup>	36.48 <sup>7</sup>	23.52 <sup>30</sup>	60.25 <sup>340</sup>	56.096 <sup>257</sup>	49.71 <sup>331</sup>	14.220 <sup>424</sup>	45.45 <sup>126</sup>
Dec. 5.6	25.677 <sup>252</sup>	36.55 <sup>23</sup>	23.82 <sup>22</sup>	63.65 <sup>364</sup>	56.353 <sup>200</sup>	53.02 <sup>356</sup>	14.644 <sup>364</sup>	46.71 <sup>152</sup>
15.6	25.929 <sup>206</sup>	36.78 <sup>37</sup>	24.04 <sup>13</sup>	67.29 <sup>377</sup>	56.553 <sup>136</sup>	56.58 <sup>366</sup>	15.008 <sup>291</sup>	48.23 <sup>175</sup>
25.5	26.135 <sup>153</sup>	37.15 <sup>51</sup>	24.17 <sup>4</sup>	71.06 <sup>378</sup>	56.689 <sup>69</sup>	60.24 <sup>366</sup>	15.299 <sup>210</sup>	49.98 <sup>191</sup>
35.5	26.288	37.66	24.21	74.84	56.758	63.90	15.509	51.89
Mean Place	19.245	45.02	20.476	67.91	52.585	56.32	5.803	59.14
Sec $\delta$ , Tan $\delta$	1.207	+0.676	2.120	-1.860	1.573	-1.214	1.916	+1.634
$D\psi \alpha$ , $D_w \alpha$	+0.08	+0.01	+0.01	-0.03	+0.03	-0.02	+0.10	+0.82
$D\psi \delta$ , $D_w \delta$	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Canis Majoris. Mag. 4.2			$\epsilon$ Canis Majoris. Mag. 1.6			$\zeta$ Geminorum. Var. 3.7-4.3			$\alpha^2$ Canis Majoris. Mag. 3.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 6 50	s	° ' " -11 55	h m 6 55	s	° ' " -28 51	h m 6 59	s	° ' " +20 41	h m 6 59	s	° ' " -23 42
Jan. 0.5	22.348	86	61.18	24.117	75	29.51	13.884	123	33.99	35.801	85	39.88
10.5	22.434	86	63.38	24.192	20	32.50	14.007	71	33.71	35.886	33	42.67
20.5	22.471	87	65.40	24.212	33	35.33	14.078	18	33.55	35.919	20	45.29
30.4	22.459	12	67.22	24.179	83	37.90	14.096	4	33.51	35.899	4	47.69
Feb. 9.4	22.401	58	68.79	24.096	83	40.19	14.062	34	33.56	35.831	68	49.80
19.4	22.301	100	70.10	23.969	127	42.12	13.982	80	33.68	35.719	112	51.59
Mar. 1.3	22.167	134	71.12	23.805	164	43.68	13.862	120	33.83	35.573	146	53.04
11.3	22.007	160	71.85	23.613	192	44.84	13.713	149	34.00	35.396	177	54.12
21.3	21.831	176	72.30	23.403	210	45.60	13.543	170	34.15	35.203	193	54.81
31.3	21.648	183	72.45	23.186	217	45.93	13.365	178	34.27	35.000	203	55.14
Apr. 10.2	21.470	178	72.33	22.972	214	45.86	13.190	175	34.36	34.800	200	55.09
20.2	21.305	165	71.94	22.770	202	45.40	13.028	162	34.39	34.611	189	54.67
30.2	21.160	145	71.28	22.588	182	44.55	12.887	141	34.39	34.443	168	53.90
May 10.2	21.043	117	70.38	22.435	153	43.33	12.776	111	34.36	34.300	143	52.79
20.1	20.958	85	69.24	22.316	119	41.78	12.699	77	34.30	34.190	110	51.41
30.1	20.908	50	67.91	22.233	83	39.94	12.661	38	34.23	34.116	74	49.73
June 9.1	20.897	11	66.41	22.190	43	37.84	12.661	0	34.16	34.080	36	47.83
19.0	20.924	27	64.76	22.188	2	35.56	12.702	41	34.09	34.083	3	45.74
29.0	20.988	64	63.03	22.228	40	33.14	12.783	81	34.03	34.126	43	43.54
July 9.0	21.087	99	61.25	22.308	80	30.65	12.902	119	33.97	34.207	81	41.26
19.0	21.221	134	59.49	22.427	119	28.17	13.055	153	33.91	34.325	118	38.99
28.9	21.386	165	57.81	22.581	154	25.78	13.239	184	33.83	34.478	153	36.80
Aug. 7.9	21.578	192	56.26	22.768	187	23.56	13.452	213	33.73	34.662	184	34.78
17.9	21.795	217	54.90	22.987	219	21.59	13.690	238	33.58	34.874	212	32.96
27.9	22.034	239	53.81	23.232	245	19.94	13.950	260	33.36	35.110	236	31.47
Sept. 6.8	22.291	257	53.02	23.501	269	18.70	14.228	278	33.07	35.370	260	30.34
16.8	22.563	272	52.60	23.787	286	17.91	14.521	293	32.68	35.648	278	29.63
26.8	22.847	284	52.55	24.090	303	17.62	14.828	297	32.20	35.939	291	29.40
Oct. 6.7	23.139	292	52.94	24.402	312	17.86	15.144	306	31.63	36.243	304	29.65
16.7	23.435	296	53.70	24.718	316	18.64	15.466	322	30.96	36.550	307	29.65
26.7	23.730	295	54.87	25.033	315	19.94	15.789	323	30.22	36.857	307	30.41
Nov. 5.7	24.018	288	56.40	25.339	306	21.73	16.108	319	29.45	37.158	301	31.66
15.6	24.294	276	58.22	25.630	291	23.95	16.417	309	28.66	37.445	287	33.37
25.6	24.551	257	60.29	25.897	267	26.52	16.710	293	27.89	37.711	266	35.47
Dec. 5.6	24.782	231	62.53	26.135	238	29.35	16.978	268	27.19	37.950	239	37.89
15.6	24.979	197	64.85	26.334	199	32.37	17.214	236	26.58	38.153	203	40.57
25.5	25.136	157	67.18	26.487	153	35.45	17.412	198	26.08	38.313	160	43.39
35.5	25.249	113	69.44	26.591	104	38.50	17.562	150	25.71	38.427	114	46.28
Mean Place	20.048		61.24	21.817		30.10	11.248		35.05	33.520		40.29
Sec $\delta$ , Tan $\delta$	1.022		-0.211	1.142		-0.551	1.069		+0.378	1.092		-0.439
$D\psi\alpha$ , $D\omega\alpha$	+0.06		0.00	+0.05		-0.01	+0.07		+0.01	+0.05		-0.01
$D\psi\delta$ , $D\omega\delta$	-0.1		+1.0	-0.1		+1.0	-0.1		+1.0	-0.1		+1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Canis Majoris. Mag. 4.1		$\delta$ Canis Majoris. Mag. 2.0		63 Aurigæ. Mag. 5.1		51 Geminorum. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 0	° ' " -15 30	h m 7 5	° ' " -26 15	h m 7 5	° ' " +39 27	h m 7 8	° ' " +16 17
	s	"	s	"	s	"	s	"
Jan. 0.5	2.506 <sup>92</sup>	35.19 <sup>241</sup>	3.215 <sup>88</sup>	37.80 <sup>292</sup>	60.139 <sup>151</sup>	23.73 <sup>87</sup>	38.969 <sup>128</sup>	61.50 <sup>60</sup>
10.5	2.598 <sup>43</sup>	37.60 <sup>225</sup>	3.303 <sup>35</sup>	40.72 <sup>276</sup>	60.290 <sup>88</sup>	24.60 <sup>98</sup>	39.097 <sup>78</sup>	60.90 <sup>45</sup>
20.5	2.641 <sup>7</sup>	39.85 <sup>202</sup>	3.338 <sup>18</sup>	43.48 <sup>253</sup>	60.378 <sup>25</sup>	25.58 <sup>104</sup>	39.175 <sup>26</sup>	60.45 <sup>32</sup>
30.4	2.634 <sup>54</sup>	41.87 <sup>178</sup>	3.320 <sup>68</sup>	46.01 <sup>224</sup>	60.403 <sup>38</sup>	26.62 <sup>105</sup>	39.201 <sup>25</sup>	60.13 <sup>18</sup>
Feb. 9.4	2.580 <sup>97</sup>	43.65 <sup>149</sup>	3.252 <sup>113</sup>	48.25 <sup>192</sup>	60.365 <sup>94</sup>	27.67 <sup>101</sup>	39.176 <sup>71</sup>	59.95 <sup>8</sup>
19.4	2.483 <sup>133</sup>	45.14 <sup>118</sup>	3.139 <sup>151</sup>	50.17 <sup>156</sup>	60.271 <sup>143</sup>	28.68 <sup>89</sup>	39.105 <sup>111</sup>	59.87 <sup>0</sup>
Mar. 1.4	2.350 <sup>161</sup>	46.32 <sup>88</sup>	2.988 <sup>179</sup>	51.73 <sup>118</sup>	60.128 <sup>181</sup>	29.57 <sup>73</sup>	38.994 <sup>140</sup>	59.87 <sup>5</sup>
11.3	2.189 <sup>178</sup>	47.20 <sup>56</sup>	2.809 <sup>198</sup>	52.91 <sup>79</sup>	59.947 <sup>207</sup>	30.30 <sup>54</sup>	38.854 <sup>162</sup>	59.92 <sup>9</sup>
21.3	2.011 <sup>185</sup>	47.76 <sup>24</sup>	2.611 <sup>207</sup>	53.70 <sup>39</sup>	59.740 <sup>218</sup>	30.84 <sup>31</sup>	38.692 <sup>172</sup>	60.01 <sup>11</sup>
31.3	1.826 <sup>184</sup>	48.00 <sup>6</sup>	2.404 <sup>207</sup>	54.09 <sup>1</sup>	59.522 <sup>217</sup>	31.15 <sup>9</sup>	38.520 <sup>171</sup>	60.12 <sup>11</sup>
Apr. 10.2	1.642 <sup>171</sup>	47.94 <sup>38</sup>	2.197 <sup>195</sup>	54.10 <sup>38</sup>	59.305 <sup>203</sup>	31.24 <sup>16</sup>	38.349 <sup>159</sup>	60.23 <sup>12</sup>
20.2	1.471 <sup>153</sup>	47.56 <sup>67</sup>	2.002 <sup>177</sup>	53.72 <sup>75</sup>	59.102 <sup>179</sup>	31.08 <sup>28</sup>	38.190 <sup>141</sup>	60.35 <sup>11</sup>
30.2	1.318 <sup>126</sup>	46.89 <sup>93</sup>	1.825 <sup>151</sup>	52.97 <sup>110</sup>	58.923 <sup>147</sup>	30.70 <sup>58</sup>	38.049 <sup>113</sup>	60.46 <sup>11</sup>
May 10.2	1.192 <sup>96</sup>	45.96 <sup>119</sup>	1.674 <sup>118</sup>	51.87 <sup>141</sup>	58.776 <sup>106</sup>	30.12 <sup>76</sup>	37.936 <sup>81</sup>	60.57 <sup>13</sup>
20.1	1.096 <sup>60</sup>	44.77 <sup>141</sup>	1.556 <sup>83</sup>	50.46 <sup>172</sup>	58.670 <sup>61</sup>	29.36 <sup>90</sup>	37.855 <sup>47</sup>	60.70 <sup>13</sup>
30.1	1.036 <sup>23</sup>	43.36 <sup>161</sup>	1.473 <sup>46</sup>	48.74 <sup>195</sup>	58.609 <sup>13</sup>	28.46 <sup>102</sup>	37.808 <sup>6</sup>	60.83 <sup>14</sup>
June 9.1	1.013 <sup>15</sup>	41.75 <sup>176</sup>	1.427 <sup>6</sup>	46.79 <sup>215</sup>	58.596 <sup>36</sup>	27.44 <sup>110</sup>	37.802 <sup>32</sup>	60.97 <sup>16</sup>
19.1	1.028 <sup>51</sup>	39.99 <sup>186</sup>	1.421 <sup>34</sup>	44.64 <sup>229</sup>	58.632 <sup>83</sup>	26.34 <sup>115</sup>	37.834 <sup>69</sup>	61.13 <sup>17</sup>
29.0	1.079 <sup>88</sup>	38.13 <sup>192</sup>	1.455 <sup>74</sup>	42.35 <sup>235</sup>	58.715 <sup>129</sup>	25.19 <sup>118</sup>	37.903 <sup>106</sup>	61.30 <sup>17</sup>
July 9.0	1.167 <sup>123</sup>	36.21 <sup>191</sup>	1.529 <sup>111</sup>	40.00 <sup>236</sup>	58.844 <sup>172</sup>	24.01 <sup>116</sup>	38.009 <sup>139</sup>	61.47 <sup>16</sup>
19.0	1.290 <sup>155</sup>	34.30 <sup>184</sup>	1.640 <sup>145</sup>	37.64 <sup>229</sup>	59.016 <sup>211</sup>	22.85 <sup>115</sup>	38.148 <sup>171</sup>	61.63 <sup>14</sup>
28.9	1.445 <sup>183</sup>	32.46 <sup>169</sup>	1.785 <sup>178</sup>	35.35 <sup>213</sup>	59.227 <sup>246</sup>	21.70 <sup>113</sup>	38.319 <sup>199</sup>	61.77 <sup>9</sup>
Aug. 7.9	1.628 <sup>210</sup>	30.77 <sup>150</sup>	1.963 <sup>209</sup>	33.22 <sup>191</sup>	59.473 <sup>277</sup>	20.57 <sup>109</sup>	38.518 <sup>223</sup>	61.86 <sup>2</sup>
17.9	1.838 <sup>233</sup>	29.27 <sup>122</sup>	2.172 <sup>235</sup>	31.31 <sup>159</sup>	59.750 <sup>306</sup>	19.48 <sup>103</sup>	38.741 <sup>246</sup>	61.88 <sup>8</sup>
27.9	2.071 <sup>254</sup>	28.05 <sup>90</sup>	2.407 <sup>259</sup>	29.72 <sup>122</sup>	60.055 <sup>329</sup>	18.45 <sup>97</sup>	38.987 <sup>266</sup>	61.80 <sup>20</sup>
Sept. 6.8	2.325 <sup>270</sup>	27.15 <sup>52</sup>	2.666 <sup>279</sup>	28.50 <sup>78</sup>	60.384 <sup>349</sup>	17.48 <sup>90</sup>	39.253 <sup>281</sup>	61.60 <sup>32</sup>
16.8	2.595 <sup>283</sup>	26.63 <sup>11</sup>	2.945 <sup>294</sup>	27.72 <sup>30</sup>	60.733 <sup>364</sup>	16.58 <sup>83</sup>	39.534 <sup>295</sup>	61.28 <sup>46</sup>
26.8	2.878 <sup>294</sup>	26.52 <sup>32</sup>	3.239 <sup>306</sup>	27.42 <sup>21</sup>	61.097 <sup>377</sup>	15.75 <sup>73</sup>	39.829 <sup>307</sup>	60.82 <sup>61</sup>
Oct. 6.8	3.172 <sup>299</sup>	26.84 <sup>77</sup>	3.545 <sup>312</sup>	27.63 <sup>73</sup>	61.474 <sup>385</sup>	15.02 <sup>63</sup>	40.136 <sup>313</sup>	60.21 <sup>75</sup>
16.7	3.471 <sup>299</sup>	27.61 <sup>119</sup>	3.857 <sup>313</sup>	28.36 <sup>124</sup>	61.859 <sup>387</sup>	14.39 <sup>51</sup>	40.449 <sup>316</sup>	59.46 <sup>85</sup>
26.7	3.770 <sup>295</sup>	28.80 <sup>158</sup>	4.170 <sup>306</sup>	29.60 <sup>171</sup>	62.246 <sup>383</sup>	13.88 <sup>36</sup>	40.765 <sup>314</sup>	58.61 <sup>94</sup>
Nov. 5.7	4.065 <sup>283</sup>	30.38 <sup>191</sup>	4.476 <sup>294</sup>	31.31 <sup>213</sup>	62.629 <sup>373</sup>	13.52 <sup>18</sup>	41.079 <sup>305</sup>	57.67 <sup>100</sup>
15.6	4.348 <sup>264</sup>	32.29 <sup>219</sup>	4.770 <sup>274</sup>	33.44 <sup>249</sup>	63.002 <sup>352</sup>	13.34 <sup>0</sup>	41.384 <sup>291</sup>	56.67 <sup>101</sup>
25.6	4.612 <sup>238</sup>	34.48 <sup>238</sup>	5.044 <sup>244</sup>	35.93 <sup>274</sup>	63.354 <sup>324</sup>	13.34 <sup>21</sup>	41.675 <sup>267</sup>	55.66 <sup>98</sup>
Dec. 5.6	4.850 <sup>205</sup>	36.86 <sup>249</sup>	5.288 <sup>208</sup>	38.67 <sup>291</sup>	63.678 <sup>286</sup>	13.55 <sup>41</sup>	41.942 <sup>238</sup>	54.68 <sup>91</sup>
15.6	5.055 <sup>165</sup>	39.35 <sup>252</sup>	5.496 <sup>165</sup>	41.58 <sup>299</sup>	63.964 <sup>238</sup>	13.96 <sup>59</sup>	42.180 <sup>200</sup>	53.77 <sup>81</sup>
25.5	5.220 <sup>120</sup>	41.87 <sup>248</sup>	5.661 <sup>117</sup>	44.57 <sup>298</sup>	64.202 <sup>184</sup>	14.55 <sup>78</sup>	42.380 <sup>155</sup>	52.96 <sup>86</sup>
35.5	5.340	44.35	5.778	47.55	64.386	15.33	42.535	52.30
Mean Place	0.220	35.28	0.931	38.37	56.990	25.69	36.417	62.98
Sec $\delta$ , Tan $\delta$	1.038	-0.277	1.115	-0.493	1.295	+0.823	1.042	+0.292
$D\psi\alpha$ , $D\omega\alpha$	+0.05	0.00	+0.05	-0.01	+0.08	+0.02	+0.08	+0.01
$D\psi\delta$ , $D\omega\delta$	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0	-0.1	+1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma^2$ Volantis. Mag. 3.9		$\lambda$ Geminorum. Mag. 3.6		$\pi$ Argus. Mag. 2.7		$\delta$ Geminorum. Mag. 3.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 9	° ' " -70 21	h m 7 13	° ' " +16 41	h m 7 14	° ' " -36 56	h m 7 15	° ' " +22 7
	s	"	s	"	s	"	s	"
Jan. 0.5	30.97	48.87	22.027	26.05	15.015	51.65	12.738	68.23
10.5	30.96	52.69	22.161	25.47	15.102	54.99	12.878	67.99
20.5	30.83	56.40	22.243	25.03	15.130	58.19	12.966	67.89
30.4	30.56	59.89	22.273	24.73	15.100	61.16	13.000	67.92
Feb. 9.4	30.19	63.08	22.252	24.57	15.016	63.84	12.981	68.05
19.4	29.72	65.91	22.184	24.51	14.882	66.18	12.913	68.26
Mar. 1.4	29.17	68.30	22.076	24.53	14.706	68.11	12.803	68.52
11.3	28.55	70.21	21.937	24.60	14.498	69.62	12.661	68.78
21.3	27.89	71.60	21.776	24.71	14.268	70.69	12.495	69.01
31.3	27.20	72.47	21.605	24.84	14.026	71.30	12.319	69.21
Apr. 10.3	26.51	72.80	21.434	24.96	13.783	71.45	12.143	69.36
20.2	25.84	72.61	21.274	25.08	13.549	71.16	11.977	69.44
30.2	25.20	71.90	21.131	25.20	13.335	70.43	11.829	69.47
May 10.2	24.60	70.68	21.015	25.31	13.145	69.28	11.708	69.43
20.1	24.07	68.99	20.932	25.42	12.988	67.76	11.619	69.35
30.1	23.61	66.87	20.883	25.54	12.868	65.90	11.568	69.24
June 9.1	23.24	64.39	20.872	25.66	12.789	63.72	11.556	69.10
19.1	22.97	61.61	20.899	25.79	12.752	61.31	11.583	68.94
29.0	22.81	58.58	20.964	25.94	12.758	58.71	11.649	68.77
July 9.0	22.75	55.43	21.066	26.07	12.808	56.02	11.753	68.58
19.0	22.78	52.22	21.200	26.20	12.900	53.30	11.891	68.38
29.0	22.94	49.04	21.367	26.30	13.034	50.65	12.062	68.15
Aug. 7.9	23.21	46.03	21.561	26.35	13.206	48.15	12.263	67.89
17.9	23.57	43.26	21.782	26.32	13.415	45.88	12.489	67.58
27.9	24.02	40.84	22.024	26.20	13.655	43.94	12.740	67.22
Sept. 6.8	24.55	38.86	22.287	25.96	13.926	42.41	13.010	66.78
16.8	25.15	37.42	22.566	25.60	14.222	41.35	13.299	66.25
26.8	25.80	36.56	22.860	25.10	14.537	40.83	13.603	65.63
Oct. 6.8	26.48	36.33	23.167	24.47	14.867	40.88	13.919	64.92
16.7	27.18	36.78	23.480	23.69	15.205	41.50	14.243	64.15
26.7	27.86	37.89	23.797	22.81	15.545	42.70	14.571	63.32
Nov. 5.7	28.51	39.63	24.114	21.85	15.879	44.45	14.899	62.47
15.7	29.11	41.97	24.422	20.84	16.198	46.69	15.219	61.62
25.6	29.63	44.82	24.717	19.82	16.493	49.36	15.524	60.81
Dec. 5.6	30.06	48.07	24.989	18.83	16.755	52.36	15.808	60.09
15.6	30.37	51.65	25.231	17.92	16.977	55.58	16.060	59.47
25.5	30.57	55.41	25.436	17.11	17.151	58.94	16.274	58.98
35.5	30.64	59.24	25.596	16.45	17.272	62.31	16.443	58.64
Mean Place	27.280	51.69	19.471	27.81	12.680	52.95	10.085	70.35
Sec $\delta$ , Tan $\delta$	2.976	-2.803	1.044	+0.300	1.251	-0.752	1.080	+0.407
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	-0.01	-0.06	+0.07	+0.01	+0.04	-0.02	+0.07	+0.01
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.1	+1.0	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Volantis. Mag. 4.0		$\epsilon$ Geminorum. Mag. 3.9		$\gamma$ Canis Majoris. Mag. 2.4		Groombridge 1308. Mag. 5.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 16	° ' " -67 48	h m 7 20	° ' " +27 57	h m 7 20	° ' " -29 8	h m 7 22	° ' " +68 37
	s	"	s	"	s	"	s	"
Jan. 0.5	56.36	16.25	37.215	48.05	51.045	24.72	21.40	68.95
10.5	56.38	20.09	37.367	48.15	51.148	27.78	21.68	71.32
20.5	56.29	23.84	37.465	48.41	51.196	30.73	21.82	73.80
30.4	56.09	27.39	37.504	48.78	51.190	33.46	21.83	76.29
Feb. 9.4	55.79	30.66	37.489	49.24	51.132	35.91	21.73	78.69
19.4	55.40	33.56	37.422	49.74	51.027	38.03	21.50	80.89
Mar. 1.4	54.92	36.03	37.311	50.25	50.883	39.79	21.18	82.82
11.3	54.39	38.03	37.165	50.72	50.705	41.17	20.77	84.38
21.3	53.82	39.53	36.993	51.12	50.506	42.15	20.30	85.52
31.3	53.22	40.51	36.809	51.42	50.295	42.71	19.79	86.18
Apr. 10.3	52.62	40.94	36.623	51.59	50.084	42.88	19.28	86.35
20.2	52.03	40.84	36.446	51.65	49.879	42.62	18.79	86.03
30.2	51.46	40.22	36.289	51.59	49.690	41.98	18.33	85.23
May 10.2	50.94	39.09	36.159	51.42	49.526	40.96	17.92	84.00
20.1	50.48	37.48	36.061	51.13	49.390	39.62	17.59	82.37
30.1	50.07	35.44	36.002	50.77	49.290	37.95	17.34	80.40
June 9.1	49.74	33.01	35.983	50.35	49.226	36.02	17.19	78.17
19.1	49.50	30.28	36.004	49.87	49.202	33.86	17.13	75.72
29.0	49.35	27.30	36.067	49.36	49.217	31.56	17.19	73.13
July 9.0	49.29	24.17	36.169	48.82	49.271	29.14	17.33	70.47
19.0	49.33	20.97	36.308	48.26	49.363	26.70	17.57	67.79
29.0	49.46	17.79	36.481	47.67	49.493	24.32	17.90	65.16
Aug. 7.9	49.69	14.76	36.686	47.07	49.657	22.09	18.32	62.63
17.9	50.00	11.95	36.917	46.44	49.853	20.07	18.81	60.24
27.9	50.40	9.49	37.175	45.78	50.079	18.34	19.37	58.05
Sept. 6.8	50.88	7.47	37.455	45.08	50.331	16.99	19.98	56.09
16.8	51.41	5.96	37.754	44.33	50.605	16.07	20.65	54.40
26.8	51.99	5.04	38.069	43.56	50.900	15.63	21.36	53.00
Oct. 6.8	52.60	4.74	38.398	42.76	51.210	15.72	22.10	51.94
16.7	53.23	5.11	38.736	41.95	51.528	16.35	22.85	51.25
26.7	53.85	6.16	39.080	41.14	51.849	17.50	23.61	50.95
Nov. 5.7	54.45	7.83	39.424	40.37	52.166	19.16	24.37	51.04
15.7	55.00	10.11	39.761	39.67	52.473	21.28	25.10	51.56
25.6	55.48	12.91	40.083	39.06	52.761	23.78	25.79	52.48
Dec. 5.6	55.90	16.14	40.382	38.57	53.021	26.57	26.42	53.80
15.6	56.21	19.70	40.650	38.24	53.245	29.58	26.97	55.49
25.5	56.43	23.46	40.879	38.08	53.427	32.69	27.42	57.50
35.5	56.53	27.30	41.060	38.08	53.560	35.81	27.76	59.74
Mean Place	52.958	19.34	34.438	50.80	48.770	25.61	15.511	72.89
Sec $\delta$ , Tan $\delta$	2.647	-2.451	1.132	+0.531	1.145	-0.558	2.745	+2.556
$D\psi\alpha$ , $D\omega\alpha$	0.00	-0.05	+0.07	+0.01	+0.05	-0.01	+0.13	+0.06
$D\psi\delta$ , $D\omega\delta$	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Canis Minoris. Mag. 3.1		$\rho$ Geminorum. Mag. 4.2		$\sigma$ Argus. Mag. 3.3		$\alpha^2$ Geminorum. (Castor.) Mag. 2.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 22	° ' " + 8 27	h m 7 23	° ' " +31 56	h m 7 26	° ' " -43 7	h m 7 29	° ' " +32 4
	s	"	s	"	s	"	s	"
Jan. 0.5	41.479 <sup>136</sup>	25.14 <sup>112</sup>	49.393 <sup>162</sup>	59.75 <sup>35</sup>	38.187 <sup>96</sup>	56.08 <sup>354</sup>	21.275 <sup>168</sup>	15.47 <sup>33</sup>
10.5	41.615 <sup>85</sup>	24.02 <sup>97</sup>	49.555 <sup>104</sup>	60.10 <sup>50</sup>	38.283 <sup>33</sup>	59.62 <sup>343</sup>	21.443 <sup>110</sup>	15.80 <sup>48</sup>
20.5	41.700 <sup>35</sup>	23.05 <sup>80</sup>	49.659 <sup>44</sup>	60.60 <sup>61</sup>	38.316 <sup>29</sup>	63.05 <sup>324</sup>	21.553 <sup>49</sup>	16.28 <sup>61</sup>
30.5	41.735 <sup>15</sup>	22.25 <sup>63</sup>	49.703 <sup>12</sup>	61.21 <sup>70</sup>	38.287 <sup>90</sup>	66.29 <sup>294</sup>	21.602 <sup>8</sup>	16.89 <sup>71</sup>
Feb. 9.4	41.720 <sup>61</sup>	21.62 <sup>47</sup>	49.691 <sup>67</sup>	61.91 <sup>72</sup>	38.197 <sup>145</sup>	69.23 <sup>260</sup>	21.594 <sup>62</sup>	17.60 <sup>73</sup>
19.4	41.659 <sup>99</sup>	21.15 <sup>33</sup>	49.624 <sup>114</sup>	62.63 <sup>68</sup>	38.052 <sup>189</sup>	71.83 <sup>220</sup>	21.532 <sup>110</sup>	18.33 <sup>70</sup>
Mar. 1.4	41.560 <sup>132</sup>	20.82 <sup>18</sup>	49.510 <sup>150</sup>	63.31 <sup>62</sup>	37.863 <sup>228</sup>	74.03 <sup>176</sup>	21.422 <sup>147</sup>	19.03 <sup>64</sup>
11.3	41.428 <sup>153</sup>	20.64 <sup>8</sup>	49.360 <sup>178</sup>	63.93 <sup>52</sup>	37.635 <sup>254</sup>	75.79 <sup>130</sup>	21.275 <sup>176</sup>	19.67 <sup>54</sup>
21.3	41.275 <sup>165</sup>	20.56 <sup>3</sup>	49.182 <sup>191</sup>	64.45 <sup>37</sup>	37.381 <sup>268</sup>	77.09 <sup>83</sup>	21.099 <sup>190</sup>	20.21 <sup>41</sup>
31.3	41.110 <sup>165</sup>	20.59 <sup>11</sup>	48.991 <sup>194</sup>	64.82 <sup>21</sup>	37.113 <sup>271</sup>	77.92 <sup>34</sup>	20.909 <sup>195</sup>	20.62 <sup>24</sup>
Apr. 10.3	40.945 <sup>158</sup>	20.70 <sup>18</sup>	48.797 <sup>185</sup>	65.03 <sup>6</sup>	36.842 <sup>265</sup>	78.26 <sup>14</sup>	20.714 <sup>187</sup>	20.86 <sup>9</sup>
20.2	40.787 <sup>142</sup>	20.88 <sup>27</sup>	48.612 <sup>165</sup>	65.09 <sup>10</sup>	36.577 <sup>248</sup>	78.12 <sup>61</sup>	20.527 <sup>169</sup>	20.95 <sup>8</sup>
30.2	40.645 <sup>117</sup>	21.15 <sup>33</sup>	48.447 <sup>139</sup>	64.99 <sup>27</sup>	36.329 <sup>224</sup>	77.51 <sup>106</sup>	20.358 <sup>142</sup>	20.87 <sup>25</sup>
May 10.2	40.528 <sup>89</sup>	21.48 <sup>40</sup>	48.308 <sup>104</sup>	64.72 <sup>40</sup>	36.105 <sup>193</sup>	76.45 <sup>148</sup>	20.216 <sup>108</sup>	20.62 <sup>38</sup>
20.2	40.439 <sup>55</sup>	21.88 <sup>45</sup>	48.204 <sup>68</sup>	64.32 <sup>51</sup>	35.912 <sup>155</sup>	74.97 <sup>185</sup>	20.108 <sup>71</sup>	20.24 <sup>50</sup>
30.1	40.384 <sup>19</sup>	22.33 <sup>51</sup>	48.139 <sup>24</sup>	63.81 <sup>60</sup>	35.757 <sup>113</sup>	73.12 <sup>218</sup>	20.037 <sup>29</sup>	19.74 <sup>61</sup>
June 9.1	40.365 <sup>16</sup>	22.84 <sup>55</sup>	48.115 <sup>19</sup>	63.21 <sup>69</sup>	35.644 <sup>68</sup>	70.94 <sup>248</sup>	20.008 <sup>12</sup>	19.13 <sup>70</sup>
19.1	40.381 <sup>51</sup>	23.39 <sup>59</sup>	48.134 <sup>61</sup>	62.52 <sup>73</sup>	35.576 <sup>21</sup>	68.46 <sup>268</sup>	20.020 <sup>55</sup>	18.43 <sup>75</sup>
29.0	40.432 <sup>87</sup>	23.98 <sup>59</sup>	48.195 <sup>101</sup>	61.79 <sup>77</sup>	35.555 <sup>25</sup>	65.78 <sup>281</sup>	20.075 <sup>94</sup>	17.68 <sup>80</sup>
July 9.0	40.519 <sup>120</sup>	24.57 <sup>58</sup>	48.296 <sup>140</sup>	61.02 <sup>80</sup>	35.580 <sup>71</sup>	62.97 <sup>286</sup>	20.169 <sup>134</sup>	16.88 <sup>83</sup>
19.0	40.639 <sup>149</sup>	25.15 <sup>53</sup>	48.436 <sup>177</sup>	60.22 <sup>82</sup>	35.651 <sup>118</sup>	60.11 <sup>283</sup>	20.303 <sup>170</sup>	16.05 <sup>85</sup>
29.0	40.788 <sup>178</sup>	25.68 <sup>46</sup>	48.613 <sup>209</sup>	59.40 <sup>83</sup>	35.769 <sup>162</sup>	57.28 <sup>270</sup>	20.473 <sup>203</sup>	15.20 <sup>88</sup>
Aug. 7.9	40.966 <sup>203</sup>	26.14 <sup>36</sup>	48.822 <sup>238</sup>	58.57 <sup>85</sup>	35.931 <sup>203</sup>	54.58 <sup>246</sup>	20.676 <sup>232</sup>	14.32 <sup>89</sup>
17.9	41.169 <sup>226</sup>	26.50 <sup>20</sup>	49.060 <sup>266</sup>	57.72 <sup>85</sup>	36.134 <sup>242</sup>	52.12 <sup>216</sup>	20.908 <sup>260</sup>	13.43 <sup>90</sup>
27.9	41.395 <sup>246</sup>	26.70 <sup>4</sup>	49.326 <sup>288</sup>	56.87 <sup>86</sup>	36.376 <sup>276</sup>	49.96 <sup>175</sup>	21.168 <sup>283</sup>	12.53 <sup>92</sup>
Sept. 6.9	41.641 <sup>265</sup>	26.74 <sup>16</sup>	49.614 <sup>309</sup>	56.01 <sup>87</sup>	36.652 <sup>307</sup>	48.21 <sup>127</sup>	21.451 <sup>306</sup>	11.61 <sup>93</sup>
16.8	41.906 <sup>280</sup>	26.58 <sup>37</sup>	49.923 <sup>326</sup>	55.14 <sup>87</sup>	36.959 <sup>331</sup>	46.94 <sup>73</sup>	21.757 <sup>323</sup>	10.68 <sup>92</sup>
26.8	42.186 <sup>293</sup>	26.21 <sup>59</sup>	50.249 <sup>341</sup>	54.27 <sup>86</sup>	37.290 <sup>351</sup>	46.21 <sup>15</sup>	22.080 <sup>339</sup>	9.76 <sup>92</sup>
Oct. 6.8	42.479 <sup>303</sup>	25.62 <sup>81</sup>	50.590 <sup>352</sup>	53.41 <sup>84</sup>	37.641 <sup>362</sup>	46.06 <sup>48</sup>	22.419 <sup>351</sup>	8.84 <sup>90</sup>
16.7	42.782 <sup>307</sup>	24.81 <sup>100</sup>	50.942 <sup>358</sup>	52.57 <sup>78</sup>	38.003 <sup>366</sup>	46.54 <sup>108</sup>	22.770 <sup>357</sup>	7.94 <sup>84</sup>
26.7	43.089 <sup>307</sup>	23.81 <sup>118</sup>	51.300 <sup>357</sup>	51.79 <sup>70</sup>	38.369 <sup>361</sup>	47.62 <sup>166</sup>	23.127 <sup>359</sup>	7.10 <sup>76</sup>
Nov. 5.7	43.396 <sup>301</sup>	22.63 <sup>130</sup>	51.657 <sup>350</sup>	51.09 <sup>67</sup>	38.730 <sup>345</sup>	49.28 <sup>221</sup>	23.486 <sup>352</sup>	6.34 <sup>65</sup>
15.7	43.697 <sup>289</sup>	21.33 <sup>139</sup>	52.007 <sup>337</sup>	50.49 <sup>60</sup>	39.075 <sup>322</sup>	51.49 <sup>268</sup>	23.838 <sup>339</sup>	5.69 <sup>52</sup>
25.6	43.986 <sup>267</sup>	19.94 <sup>142</sup>	52.344 <sup>313</sup>	50.02 <sup>30</sup>	39.397 <sup>286</sup>	54.17 <sup>305</sup>	24.177 <sup>317</sup>	5.17 <sup>36</sup>
Dec. 5.6	44.253 <sup>240</sup>	18.52 <sup>139</sup>	52.657 <sup>282</sup>	49.72 <sup>13</sup>	39.683 <sup>242</sup>	57.22 <sup>333</sup>	24.494 <sup>286</sup>	4.81 <sup>16</sup>
15.6	44.493 <sup>204</sup>	17.13 <sup>132</sup>	52.939 <sup>240</sup>	49.59 <sup>5</sup>	39.925 <sup>190</sup>	60.55 <sup>351</sup>	24.780 <sup>245</sup>	4.65 <sup>3</sup>
25.6	44.697 <sup>161</sup>	15.81 <sup>121</sup>	53.179 <sup>190</sup>	49.64 <sup>25</sup>	40.115 <sup>133</sup>	64.06 <sup>356</sup>	25.025 <sup>196</sup>	4.68 <sup>22</sup>
35.5	44.858	14.60	53.369	49.89	40.248	67.62	25.221	4.90
Mean Place	39.049	26.92	46.515	62.93	35.800	58.09	18.402	19.07
Sec $\delta$ , Tan $\delta$	1.011	+0.149	1.178	+0.624	1.370	-0.937	1.180	+0.627
$D\psi a$ , $D\omega a$	+0.07	0.00	+0.08	+0.01	+0.05	-0.02	+0.08	+0.02
$D\psi \delta$ , $D\omega \delta$	-0.1	+0.9	-0.1	+0.9	-0.1	+0.9	-0.2	+0.9



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	25 Monocerotis. Mag. 5.2		$\alpha$ Canis Minoris. (Procyon.) Mag. 0.5		24 Lyncis. Mag. 5.0		$\kappa$ Geminorum. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 33 s	° ' " - 3 55 "	h m 7 34 s	° ' " + 5 26 "	h m 7 35 s	° ' " +58 54 "	h m 7 39 s	° ' " +24 35 "
Jan. 0.5	11.366 <sup>136</sup>	30.15 <sup>189</sup>	59.798 <sup>139</sup>	16.26 <sup>136</sup>	63.927 <sup>243</sup>	16.18 <sup>184</sup>	29.046 <sup>168</sup>	48.84 <sup>17</sup>
10.5	11.502 <sup>86</sup>	32.04 <sup>173</sup>	59.937 <sup>91</sup>	14.90 <sup>120</sup>	64.170 <sup>152</sup>	18.02 <sup>200</sup>	29.214 <sup>115</sup>	48.67 <sup>1</sup>
20.5	11.588 <sup>36</sup>	33.77 <sup>154</sup>	60.028 <sup>40</sup>	13.70 <sup>102</sup>	64.322 <sup>59</sup>	20.02 <sup>208</sup>	29.329 <sup>60</sup>	48.66 <sup>15</sup>
30.5	11.624 <sup>13</sup>	35.31 <sup>134</sup>	60.068 <sup>10</sup>	12.68 <sup>84</sup>	64.381 <sup>33</sup>	22.10 <sup>206</sup>	29.389 <sup>4</sup>	48.81 <sup>29</sup>
Feb. 9.4	11.611 <sup>58</sup>	36.65 <sup>110</sup>	60.058 <sup>56</sup>	11.84 <sup>64</sup>	64.348 <sup>119</sup>	24.16 <sup>196</sup>	29.393 <sup>48</sup>	49.10 <sup>37</sup>
19.4	11.553 <sup>97</sup>	37.75 <sup>88</sup>	60.002 <sup>95</sup>	11.20 <sup>47</sup>	64.229 <sup>198</sup>	26.12 <sup>175</sup>	29.345 <sup>93</sup>	49.47 <sup>41</sup>
Mar. 1.4	11.456 <sup>130</sup>	38.63 <sup>63</sup>	59.907 <sup>128</sup>	10.73 <sup>31</sup>	64.031 <sup>260</sup>	27.87 <sup>149</sup>	29.252 <sup>130</sup>	49.88 <sup>42</sup>
11.4	11.326 <sup>151</sup>	39.26 <sup>42</sup>	59.779 <sup>150</sup>	10.42 <sup>15</sup>	63.771 <sup>306</sup>	29.36 <sup>115</sup>	29.122 <sup>158</sup>	50.30 <sup>40</sup>
21.3	11.175 <sup>165</sup>	39.68 <sup>19</sup>	59.629 <sup>164</sup>	10.27 <sup>3</sup>	63.465 <sup>334</sup>	30.51 <sup>77</sup>	28.964 <sup>173</sup>	50.70 <sup>35</sup>
31.3	11.010 <sup>169</sup>	39.87 <sup>0</sup>	59.465 <sup>165</sup>	10.24 <sup>9</sup>	63.131 <sup>345</sup>	31.28 <sup>35</sup>	28.791 <sup>177</sup>	51.05 <sup>25</sup>
Apr. 10.3	10.841 <sup>160</sup>	39.87 <sup>21</sup>	59.300 <sup>159</sup>	10.33 <sup>20</sup>	62.786 <sup>338</sup>	31.63 <sup>6</sup>	28.614 <sup>173</sup>	51.30 <sup>18</sup>
20.2	10.681 <sup>147</sup>	39.66 <sup>39</sup>	59.141 <sup>145</sup>	10.53 <sup>29</sup>	62.448 <sup>315</sup>	31.57 <sup>47</sup>	28.441 <sup>156</sup>	51.48 <sup>9</sup>
30.2	10.534 <sup>125</sup>	39.27 <sup>57</sup>	58.996 <sup>121</sup>	10.82 <sup>37</sup>	62.135 <sup>273</sup>	31.10 <sup>86</sup>	28.285 <sup>134</sup>	51.57 <sup>1</sup>
May 10.2	10.409 <sup>99</sup>	38.70 <sup>75</sup>	58.875 <sup>94</sup>	11.19 <sup>46</sup>	61.860 <sup>226</sup>	30.24 <sup>122</sup>	28.151 <sup>104</sup>	51.56 <sup>10</sup>
20.2	10.310 <sup>67</sup>	37.95 <sup>89</sup>	58.781 <sup>62</sup>	11.65 <sup>54</sup>	61.634 <sup>167</sup>	29.02 <sup>153</sup>	28.047 <sup>70</sup>	51.46 <sup>17</sup>
30.1	10.243 <sup>35</sup>	37.06 <sup>102</sup>	58.719 <sup>28</sup>	12.19 <sup>61</sup>	61.467 <sup>103</sup>	27.49 <sup>178</sup>	27.977 <sup>33</sup>	51.29 <sup>25</sup>
June 9.1	10.208 <sup>1</sup>	36.04 <sup>112</sup>	58.691 <sup>6</sup>	12.80 <sup>66</sup>	61.364 <sup>35</sup>	25.71 <sup>199</sup>	27.944 <sup>5</sup>	51.04 <sup>29</sup>
19.1	10.207 <sup>35</sup>	34.92 <sup>121</sup>	58.697 <sup>42</sup>	13.46 <sup>69</sup>	61.329 <sup>34</sup>	23.72 <sup>215</sup>	27.949 <sup>43</sup>	50.75 <sup>34</sup>
29.1	10.242 <sup>68</sup>	33.71 <sup>124</sup>	58.739 <sup>76</sup>	14.15 <sup>70</sup>	61.363 <sup>103</sup>	21.57 <sup>224</sup>	27.992 <sup>81</sup>	50.41 <sup>37</sup>
July 9.0	10.310 <sup>100</sup>	32.47 <sup>124</sup>	58.815 <sup>109</sup>	14.85 <sup>68</sup>	61.466 <sup>168</sup>	19.33 <sup>229</sup>	28.073 <sup>116</sup>	50.04 <sup>42</sup>
19.0	10.410 <sup>131</sup>	31.23 <sup>119</sup>	58.924 <sup>137</sup>	15.53 <sup>63</sup>	61.634 <sup>231</sup>	17.04 <sup>229</sup>	28.189 <sup>149</sup>	49.62 <sup>46</sup>
29.0	10.541 <sup>160</sup>	30.04 <sup>109</sup>	59.061 <sup>167</sup>	16.16 <sup>55</sup>	61.865 <sup>288</sup>	14.75 <sup>225</sup>	28.338 <sup>180</sup>	49.16 <sup>51</sup>
Aug. 7.9	10.701 <sup>185</sup>	28.95 <sup>95</sup>	59.228 <sup>192</sup>	16.71 <sup>43</sup>	62.153 <sup>341</sup>	12.50 <sup>216</sup>	28.518 <sup>209</sup>	48.65 <sup>56</sup>
17.9	10.886 <sup>210</sup>	28.00 <sup>74</sup>	59.420 <sup>216</sup>	17.14 <sup>27</sup>	62.494 <sup>390</sup>	10.34 <sup>204</sup>	28.727 <sup>234</sup>	48.09 <sup>62</sup>
27.9	11.096 <sup>232</sup>	27.26 <sup>51</sup>	59.636 <sup>237</sup>	17.41 <sup>8</sup>	62.884 <sup>433</sup>	8.30 <sup>189</sup>	28.961 <sup>259</sup>	47.47 <sup>70</sup>
Sept. 6.9	11.328 <sup>253</sup>	26.75 <sup>21</sup>	59.873 <sup>257</sup>	17.49 <sup>14</sup>	63.317 <sup>469</sup>	6.41 <sup>169</sup>	29.220 <sup>279</sup>	46.77 <sup>77</sup>
16.8	11.581 <sup>269</sup>	26.54 <sup>10</sup>	60.130 <sup>272</sup>	17.35 <sup>38</sup>	63.786 <sup>501</sup>	4.72 <sup>147</sup>	29.499 <sup>299</sup>	46.00 <sup>84</sup>
26.8	11.850 <sup>283</sup>	26.64 <sup>42</sup>	60.402 <sup>287</sup>	16.97 <sup>63</sup>	64.287 <sup>526</sup>	3.25 <sup>122</sup>	29.798 <sup>314</sup>	45.16 <sup>90</sup>
Oct. 6.8	12.133 <sup>294</sup>	27.06 <sup>77</sup>	60.689 <sup>297</sup>	16.34 <sup>86</sup>	64.813 <sup>546</sup>	2.03 <sup>95</sup>	30.112 <sup>326</sup>	44.26 <sup>96</sup>
16.8	12.427 <sup>300</sup>	27.83 <sup>109</sup>	60.986 <sup>305</sup>	15.48 <sup>111</sup>	65.359 <sup>555</sup>	1.08 <sup>63</sup>	30.438 <sup>335</sup>	43.30 <sup>99</sup>
26.7	12.727 <sup>303</sup>	28.92 <sup>138</sup>	61.291 <sup>304</sup>	14.37 <sup>130</sup>	65.914 <sup>555</sup>	0.45 <sup>29</sup>	30.773 <sup>339</sup>	42.31 <sup>100</sup>
Nov. 5.7	13.030 <sup>297</sup>	30.30 <sup>164</sup>	61.595 <sup>300</sup>	13.07 <sup>146</sup>	66.469 <sup>543</sup>	0.16 <sup>4</sup>	31.112 <sup>335</sup>	41.31 <sup>95</sup>
15.7	13.327 <sup>286</sup>	31.94 <sup>183</sup>	61.895 <sup>289</sup>	11.61 <sup>157</sup>	67.012 <sup>521</sup>	0.20 <sup>42</sup>	31.447 <sup>324</sup>	40.36 <sup>88</sup>
25.6	13.613 <sup>266</sup>	33.77 <sup>196</sup>	62.184 <sup>269</sup>	10.04 <sup>162</sup>	67.533 <sup>483</sup>	0.62 <sup>78</sup>	31.771 <sup>305</sup>	39.48 <sup>78</sup>
Dec. 5.6	13.879 <sup>239</sup>	35.73 <sup>203</sup>	62.453 <sup>243</sup>	8.42 <sup>161</sup>	68.016 <sup>432</sup>	1.40 <sup>113</sup>	32.076 <sup>277</sup>	38.70 <sup>62</sup>
15.6	14.118 <sup>202</sup>	37.76 <sup>202</sup>	62.696 <sup>207</sup>	6.81 <sup>156</sup>	68.448 <sup>367</sup>	2.53 <sup>144</sup>	32.353 <sup>240</sup>	38.08 <sup>47</sup>
25.6	14.320 <sup>161</sup>	39.78 <sup>196</sup>	62.903 <sup>165</sup>	5.25 <sup>145</sup>	68.815 <sup>291</sup>	3.97 <sup>172</sup>	32.593 <sup>196</sup>	37.61 <sup>28</sup>
35.5	14.481	41.74	63.068	3.80	69.106	5.69	32.789	37.33
Mean Place	9.064	28.96	57.476	18.37	59.578	21.49	26.375	52.70
Sec $\delta$ , Tan $\delta$	1.002	-0.069	1.005	+0.095	1.936	+1.658	1.100	+0.458
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.06	0.00	+0.06	0.00	+0.10	+0.04	+0.07	+0.01
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Geminorum. (Pollux.) Mag. 1.2		$\epsilon$ Puppis. Mag. 5.1		$\xi$ Argus. Mag. 3.5		$\phi$ Geminorum. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 40	° ' " +28 13	h m 7 42	° ' " -14 21	h m 7 45	° ' " -24 38	h m 7 48	° ' " +26 58
	s	"	s	"	s	"	s	"
Jan. 0.5	17.122 <sub>172</sub>	35.45	9.801 <sub>136</sub>	40.95	50.435 <sub>135</sub>	61.87	27.940 <sub>181</sub>	49.50 <sub>7</sub>
10.5	17.294 <sub>118</sub>	35.49 <sub>4</sub>	9.937 <sub>87</sub>	43.42 <sub>247</sub>	50.570 <sub>82</sub>	64.82 <sub>295</sub>	28.121 <sub>127</sub>	49.43 <sub>12</sub>
20.5	17.412 <sub>61</sub>	35.73 <sub>24</sub>	10.024 <sub>37</sub>	45.76 <sub>234</sub>	50.652 <sub>28</sub>	67.66 <sub>284</sub>	28.248 <sub>70</sub>	49.55 <sub>29</sub>
30.5	17.473 <sub>4</sub>	36.10 <sub>37</sub>	10.061 <sub>14</sub>	47.89 <sub>213</sub>	50.680 <sub>34</sub>	70.31 <sub>265</sub>	28.318 <sub>13</sub>	49.84 <sub>41</sub>
Feb. 9.4	17.477 <sub>50</sub>	36.58 <sub>48</sub>	10.047 <sub>61</sub>	49.80 <sub>163</sub>	50.656 <sub>72</sub>	72.72 <sub>241</sub>	28.331 <sub>40</sub>	50.25 <sub>50</sub>
19.4	17.427 <sub>98</sub>	37.14 <sub>58</sub>	9.986 <sub>100</sub>	51.43 <sub>136</sub>	50.584 <sub>114</sub>	74.82 <sub>178</sub>	28.291 <sub>87</sub>	50.75 <sub>55</sub>
Mar. 1.4	17.329 <sub>135</sub>	37.72 <sub>56</sub>	9.886 <sub>134</sub>	52.79 <sub>104</sub>	50.470 <sub>148</sub>	76.60 <sub>143</sub>	28.204 <sub>126</sub>	51.30 <sub>55</sub>
11.4	17.194 <sub>164</sub>	38.28 <sub>50</sub>	9.752 <sub>158</sub>	53.83 <sub>74</sub>	50.322 <sub>174</sub>	78.03 <sub>105</sub>	28.078 <sub>156</sub>	51.85 <sub>51</sub>
21.3	17.030 <sub>180</sub>	38.78 <sub>42</sub>	9.594 <sub>171</sub>	54.57 <sub>45</sub>	50.148 <sub>189</sub>	79.08 <sub>88</sub>	27.922 <sub>174</sub>	52.36 <sub>43</sub>
31.3	16.850 <sub>185</sub>	39.20 <sub>29</sub>	9.423 <sub>176</sub>	55.02 <sub>14</sub>	49.959 <sub>195</sub>	79.76 <sub>31</sub>	27.748 <sub>180</sub>	52.79 <sub>34</sub>
Apr. 10.3	16.665 <sub>180</sub>	39.49 <sub>16</sub>	9.247 <sub>172</sub>	55.16 <sub>15</sub>	49.764 <sub>191</sub>	80.07 <sub>7</sub>	27.568 <sub>176</sub>	53.13 <sub>21</sub>
20.2	16.485 <sub>164</sub>	39.65 <sub>9</sub>	9.075 <sub>158</sub>	55.01 <sub>42</sub>	49.573 <sub>179</sub>	80.00 <sub>42</sub>	27.392 <sub>162</sub>	53.34 <sub>10</sub>
30.2	16.321 <sub>181</sub>	39.69 <sub>4</sub>	8.917 <sub>9</sub>	54.59 <sub>70</sub>	49.394 <sub>159</sub>	79.58 <sub>77</sub>	27.230 <sub>141</sub>	53.44 <sub>2</sub>
May 10.2	16.180 <sub>110</sub>	39.60 <sub>21</sub>	8.777 <sub>113</sub>	53.89 <sub>94</sub>	49.235 <sub>135</sub>	78.81 <sub>110</sub>	27.089 <sub>112</sub>	53.42 <sub>14</sub>
20.2	16.070 <sub>75</sub>	39.39 <sub>32</sub>	8.664 <sub>84</sub>	52.95 <sub>118</sub>	49.100 <sub>104</sub>	77.71 <sub>138</sub>	26.977 <sub>78</sub>	53.28 <sub>24</sub>
30.1	15.995 <sub>37</sub>	39.07 <sub>40</sub>	8.580 <sub>53</sub>	51.77 <sub>136</sub>	48.996 <sub>72</sub>	76.33 <sub>166</sub>	26.899 <sub>43</sub>	53.04 <sub>33</sub>
June 9.1	15.958 <sub>1</sub>	38.67 <sub>47</sub>	8.527 <sub>17</sub>	50.41 <sub>152</sub>	48.924 <sub>36</sub>	74.67 <sub>187</sub>	26.856 <sub>4</sub>	52.71 <sub>41</sub>
19.1	15.959 <sub>42</sub>	38.20 <sub>54</sub>	8.510 <sub>17</sub>	48.89 <sub>166</sub>	48.888 <sub>1</sub>	72.80 <sub>203</sub>	26.852 <sub>35</sub>	52.30 <sub>46</sub>
29.1	16.001 <sub>81</sub>	37.66 <sub>59</sub>	8.527 <sub>50</sub>	47.23 <sub>172</sub>	48.887 <sub>36</sub>	70.77 <sub>215</sub>	26.887 <sub>73</sub>	51.84 <sub>53</sub>
July 9.0	16.082 <sub>117</sub>	37.07 <sub>64</sub>	8.577 <sub>85</sub>	45.51 <sub>175</sub>	48.923 <sub>72</sub>	68.62 <sub>219</sub>	26.960 <sub>109</sub>	51.31 <sub>58</sub>
19.0	16.199 <sub>182</sub>	36.43 <sub>67</sub>	8.662 <sub>117</sub>	43.76 <sub>170</sub>	48.995 <sub>107</sub>	66.43 <sub>216</sub>	27.069 <sub>142</sub>	50.73 <sub>64</sub>
29.0	16.351 <sub>183</sub>	35.76 <sub>73</sub>	8.779 <sub>146</sub>	42.06 <sub>159</sub>	49.102 <sub>140</sub>	64.27 <sub>205</sub>	27.211 <sub>175</sub>	50.09 <sub>69</sub>
Aug. 7.9	16.534 <sub>213</sub>	35.03 <sub>75</sub>	8.925 <sub>176</sub>	40.47 <sub>143</sub>	49.242 <sub>172</sub>	62.22 <sub>188</sub>	27.386 <sub>204</sub>	49.40 <sub>73</sub>
17.9	16.747 <sub>240</sub>	34.28 <sub>80</sub>	9.101 <sub>202</sub>	39.04 <sub>120</sub>	49.414 <sub>202</sub>	60.34 <sub>162</sub>	27.590 <sub>231</sub>	48.67 <sub>79</sub>
27.9	16.987 <sub>265</sub>	33.48 <sub>82</sub>	9.303 <sub>226</sub>	37.84 <sub>92</sub>	49.616 <sub>228</sub>	58.72 <sub>129</sub>	27.821 <sub>257</sub>	47.88 <sub>84</sub>
Sept. 6.9	17.252 <sub>285</sub>	32.63 <sub>89</sub>	9.529 <sub>249</sub>	36.92 <sub>56</sub>	49.844 <sub>255</sub>	57.43 <sub>90</sub>	28.078 <sub>278</sub>	47.04 <sub>91</sub>
16.8	17.537 <sub>306</sub>	31.74 <sub>93</sub>	9.778 <sub>268</sub>	36.36 <sub>18</sub>	50.099 <sub>275</sub>	56.53 <sub>46</sub>	28.356 <sub>300</sub>	46.13 <sub>96</sub>
26.8	17.843 <sub>322</sub>	30.81 <sub>96</sub>	10.046 <sub>284</sub>	36.18 <sub>24</sub>	50.374 <sub>294</sub>	56.07 <sub>3</sub>	28.656 <sub>316</sub>	45.17 <sub>101</sub>
Oct. 6.8	18.165 <sub>335</sub>	29.85 <sub>98</sub>	10.330 <sub>296</sub>	36.42 <sub>67</sub>	50.668 <sub>306</sub>	56.10 <sub>53</sub>	28.972 <sub>331</sub>	44.16 <sub>104</sub>
16.8	18.500 <sub>343</sub>	28.87 <sub>97</sub>	10.626 <sub>305</sub>	37.09 <sub>108</sub>	50.977 <sub>316</sub>	56.63 <sub>104</sub>	29.303 <sub>340</sub>	43.12 <sub>104</sub>
26.7	18.843 <sub>347</sub>	27.90 <sub>94</sub>	10.931 <sub>307</sub>	38.17 <sub>148</sub>	51.293 <sub>318</sub>	57.67 <sub>151</sub>	29.643 <sub>345</sub>	42.08 <sub>102</sub>
Nov. 5.7	19.190 <sub>344</sub>	26.96 <sub>86</sub>	11.238 <sub>301</sub>	39.65 <sub>182</sub>	51.611 <sub>313</sub>	59.18 <sub>195</sub>	29.988 <sub>344</sub>	41.06 <sub>96</sub>
15.7	19.534 <sub>333</sub>	26.10 <sub>75</sub>	11.539 <sub>290</sub>	41.47 <sub>212</sub>	51.924 <sub>299</sub>	61.13 <sub>232</sub>	30.332 <sub>334</sub>	40.10 <sub>87</sub>
25.6	19.867 <sub>313</sub>	25.35 <sub>61</sub>	11.829 <sub>270</sub>	43.59 <sub>234</sub>	52.223 <sub>277</sub>	63.45 <sub>263</sub>	30.666 <sub>316</sub>	39.23 <sub>72</sub>
Dec. 5.6	20.180 <sub>284</sub>	24.74 <sub>45</sub>	12.099 <sub>242</sub>	45.93 <sub>248</sub>	52.500 <sub>246</sub>	66.08 <sub>283</sub>	30.982 <sub>289</sub>	38.51 <sub>57</sub>
15.6	20.464 <sub>246</sub>	24.29 <sub>26</sub>	12.341 <sub>206</sub>	48.41 <sub>253</sub>	52.746 <sub>208</sub>	68.91 <sub>295</sub>	31.271 <sub>252</sub>	37.94 <sub>38</sub>
25.6	20.710 <sub>201</sub>	24.03 <sub>7</sub>	12.546 <sub>163</sub>	50.94 <sub>253</sub>	52.954 <sub>162</sub>	71.86 <sub>297</sub>	31.523 <sub>208</sub>	37.56 <sub>18</sub>
35.5	20.911	23.96	12.709	53.47	53.116	74.83	31.731	37.38
Mean Place	14.369	39.63	7.563	40.59	48.212	62.57	25.235	54.15
Sec $\delta$ , Tan $\delta$	1.135	+0.537	1.032	-0.256	1.100	-0.459	1.122	+0.509
$D\psi\alpha$ , $D\omega\alpha$	+0.07	+0.02	+0.05	-0.01	+0.05	-0.01	+0.07	+0.02
$D\psi\delta$ , $D\omega\delta$	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	26 Lyncis. Mag. 5.7		Groombridge 1374. Mag. 5.6		$\chi$ Argus. Mag. 3.6		$\omega$ Cancri. Mag. 5.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 7 48	" ' s +47 46	h m 7 50	" ' s +74 8	h m 7 54	" ' s -52 45	h m 7 55	" ' s +25 36
Jan. 0.6	43.993	45.24	24.70	22.37	42.658	30.19	57.334	70.40
10.5	44.215	46.43	25.13	24.83	42.789	33.98	57.520	70.22
20.5	44.366	47.81	25.39	27.47	42.846	37.72	57.653	70.23
30.5	44.445	49.30	25.47	30.19	42.829	41.32	57.730	70.43
Feb. 9.4	44.450	50.87	25.39	32.88	42.739	44.70	57.751	70.76
19.4	44.387	52.41	25.16	35.41	42.584	47.77	57.719	71.20
Mar. 1.4	44.261	53.86	24.77	37.70	42.371	50.46	57.639	71.70
11.4	44.083	55.14	24.26	39.64	42.110	52.73	57.520	72.23
21.3	43.867	56.19	23.66	41.15	41.813	54.54	57.372	72.73
31.3	43.626	56.97	23.00	42.18	41.492	55.86	57.203	73.17
Apr. 10.3	43.376	57.44	22.31	42.69	41.160	56.68	57.027	73.53
20.3	43.128	57.60	21.61	42.67	40.828	56.98	56.853	73.78
30.2	42.896	57.43	20.94	42.13	40.507	56.77	56.692	73.94
May 10.2	42.693	56.95	20.33	41.09	40.207	56.07	56.551	73.98
20.2	42.525	56.17	19.81	39.59	39.935	54.89	56.438	73.91
30.1	42.401	55.15	19.38	37.69	39.701	53.26	56.356	73.75
June 9.1	42.326	53.89	19.07	35.43	39.509	51.23	56.308	73.49
19.1	42.301	52.46	18.87	32.89	39.366	48.87	56.298	73.16
29.1	42.328	50.87	18.80	30.15	39.275	46.22	56.326	72.76
July 9.0	42.406	49.17	18.87	27.27	39.237	43.37	56.390	72.30
19.0	42.534	47.42	19.06	24.31	39.255	40.39	56.489	71.78
29.0	42.708	45.62	19.37	21.34	39.328	37.39	56.623	71.21
Aug. 8.0	42.928	43.82	19.80	18.42	39.458	34.46	56.789	70.58
17.9	43.187	42.03	20.35	15.62	39.642	31.69	56.983	69.87
27.9	43.483	40.31	20.99	12.99	39.879	29.20	57.206	69.11
Sept. 6.9	43.811	38.66	21.72	10.57	40.163	27.08	57.453	68.28
16.8	44.170	37.10	22.53	8.43	40.490	25.41	57.722	67.37
26.8	44.557	35.66	23.40	6.58	40.857	24.27	58.013	66.39
Oct. 6.8	44.965	34.36	24.33	5.09	41.254	23.73	58.324	65.35
16.8	45.391	33.25	25.30	3.99	41.671	23.83	58.649	64.27
26.7	45.828	32.33	26.29	3.31	42.099	24.56	58.985	63.16
Nov. 5.7	46.270	31.66	27.28	3.08	42.527	25.94	59.329	62.06
15.7	46.708	31.24	28.25	3.31	42.942	27.91	59.670	61.01
25.7	47.131	31.12	29.18	4.02	43.332	30.43	60.004	60.04
Dec. 5.6	47.530	31.30	30.04	5.18	43.684	33.41	60.322	59.19
15.6	47.893	31.78	30.81	6.77	43.986	36.75	60.613	58.52
25.6	48.209	32.56	31.46	8.76	44.230	40.36	60.869	58.02
35.5	48.467	33.59	31.97	11.06	44.405	44.10	61.082	57.71
Mean Place	40.533	51.38	17.290	29.49	40.144	33.92	54.675	75.44
Sec $\delta$ , Tan $\delta$	1.488	+1.102	3.659	+3.520	1.652	-1.315	1.109	+0.480
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.09	+0.03	+0.14	+0.11	+0.03	-0.04	+0.07	+0.02
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9	-0.2	+0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Cancri. Mag. 3.8			31 Lyncis. Mag. 4.4			$\delta^1$ Cancri. Mag. 5.9			$\epsilon$ Argus. Mag. 1.7		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 8 12	s + 9 26	"	h m 8 17	s +43 26	"	h m 8 18	s +18 35	"	h m 8 20	s -59 14	"
Jan. 0.6	3.269 <sup>183</sup>	27.87	122	12.810 <sup>245</sup>	71.30	80	39.281 <sup>200</sup>	52.67	70	51.344 <sup>182</sup>	26.23	385
10.5	3.452 <sup>135</sup>	26.65	105	13.055 <sup>181</sup>	72.10	103	39.481 <sup>149</sup>	51.97	50	51.526 <sup>97</sup>	30.08	388
20.5	3.587 <sup>83</sup>	25.60	87	13.236 <sup>114</sup>	73.13	123	39.630 <sup>96</sup>	51.47	29	51.623 <sup>10</sup>	33.96	382
30.5	3.670 <sup>32</sup>	24.73	64	13.350 <sup>44</sup>	74.36	135	39.726 <sup>42</sup>	51.18	11	51.633 <sup>74</sup>	37.78	365
Feb. 9.5	3.702 <sup>17</sup>	24.09	46	13.394 <sup>21</sup>	75.71	142	39.768 <sup>9</sup>	51.07	6	51.559 <sup>154</sup>	41.43	338
19.4	3.685	23.63	29	13.373	77.13	140	39.759	51.13	18	51.405	44.81	306
Mar. 1.4	3.623 <sup>62</sup>	23.34	14	13.290 <sup>83</sup>	78.53	132	39.702 <sup>57</sup>	51.31	29	51.181 <sup>224</sup>	47.87	267
11.4	3.524 <sup>99</sup>	23.20	2	13.154 <sup>136</sup>	79.85	115	39.606 <sup>96</sup>	51.60	34	50.897 <sup>284</sup>	50.54	224
21.4	3.396 <sup>128</sup>	23.18	9	12.977 <sup>177</sup>	81.00	95	39.477 <sup>129</sup>	51.94	36	50.567 <sup>330</sup>	52.78	176
31.3	3.249 <sup>147</sup>	23.27	18	12.772 <sup>205</sup>	81.95	70	39.329 <sup>148</sup>	52.30	36	50.201 <sup>366</sup>	54.54	126
Apr. 10.3	3.093 <sup>156</sup>	23.45	25	12.551 <sup>224</sup>	82.65	43	39.169 <sup>161</sup>	52.66	33	49.815 <sup>395</sup>	55.80	74
20.3	2.937 <sup>148</sup>	23.70	29	12.327 <sup>214</sup>	83.08	13	39.008 <sup>154</sup>	52.99	29	49.420 <sup>392</sup>	56.54	21
30.2	2.789 <sup>131</sup>	23.99	33	12.113 <sup>196</sup>	83.21	16	38.854 <sup>139</sup>	53.28	23	49.028 <sup>377</sup>	56.75	31
May 10.2	2.658 <sup>109</sup>	24.32	38	11.917 <sup>167</sup>	83.05	42	38.715 <sup>116</sup>	53.51	19	48.651 <sup>350</sup>	56.44	82
20.2	2.549 <sup>83</sup>	24.70	40	11.750 <sup>132</sup>	82.63	70	38.599 <sup>90</sup>	53.70	13	48.301 <sup>316</sup>	55.62	130
30.2	2.466 <sup>54</sup>	25.10	42	11.618 <sup>93</sup>	81.93	93	38.509 <sup>59</sup>	53.83	8	47.985 <sup>273</sup>	54.32	175
June 9.1	2.412 <sup>21</sup>	25.52	44	11.525 <sup>48</sup>	81.00	114	38.450 <sup>26</sup>	53.91	2	47.712 <sup>225</sup>	52.57	215
19.1	2.391 <sup>11</sup>	25.96	45	11.477 <sup>4</sup>	79.86	131	38.424 <sup>6</sup>	53.93	3	47.487 <sup>169</sup>	50.42	249
29.1	2.402 <sup>42</sup>	26.41	43	11.473 <sup>40</sup>	78.55	145	38.430 <sup>40</sup>	53.90	8	47.318 <sup>109</sup>	47.93	275
July 9.1	2.444 <sup>74</sup>	26.84	39	11.513 <sup>85</sup>	77.10	156	38.470 <sup>73</sup>	53.82	15	47.209 <sup>44</sup>	45.18	294
19.0	2.518 <sup>104</sup>	27.23	34	11.598 <sup>128</sup>	75.54	166	38.543 <sup>105</sup>	53.67	23	47.165 <sup>20</sup>	42.24	304
29.0	2.622 <sup>132</sup>	27.57	24	11.726 <sup>168</sup>	73.88	171	38.648 <sup>134</sup>	53.44	30	47.185 <sup>89</sup>	39.20	303
Aug. 8.0	2.754 <sup>161</sup>	27.81	15	11.894 <sup>206</sup>	72.17	174	38.782 <sup>163</sup>	53.14	40	47.274 <sup>156</sup>	36.17	293
17.9	2.915 <sup>187</sup>	27.96	0	12.100 <sup>243</sup>	70.43	175	38.945 <sup>190</sup>	52.74	51	47.430 <sup>221</sup>	33.24	272
27.9	3.102 <sup>212</sup>	27.96	18	12.343 <sup>276</sup>	68.68	175	39.135 <sup>217</sup>	52.23	63	47.651 <sup>285</sup>	30.52	241
Sept. 6.9	3.314 <sup>234</sup>	27.78	35	12.619 <sup>309</sup>	66.93	171	39.352 <sup>240</sup>	51.60	77	47.936 <sup>344</sup>	28.11	199
16.9	3.548 <sup>258</sup>	27.43	57	12.928 <sup>336</sup>	65.22	163	39.592 <sup>264</sup>	50.83	90	48.280 <sup>395</sup>	26.12	149
26.8	3.806 <sup>276</sup>	26.86	79	13.264 <sup>364</sup>	63.59	156	39.856 <sup>285</sup>	49.93	103	48.675 <sup>438</sup>	24.63	93
Oct. 6.8	4.082 <sup>293</sup>	26.07	98	13.628 <sup>385</sup>	62.03	144	40.141 <sup>304</sup>	48.90	117	49.113 <sup>471</sup>	23.70	29
16.8	4.375 <sup>307</sup>	25.09	120	14.013 <sup>403</sup>	60.59	128	40.445 <sup>318</sup>	47.73	126	49.584 <sup>494</sup>	23.41	35
26.8	4.682 <sup>316</sup>	23.89	135	14.416 <sup>413</sup>	59.31	108	40.763 <sup>327</sup>	46.47	132	50.078 <sup>499</sup>	23.76	102
Nov. 5.7	4.998 <sup>317</sup>	22.54	147	14.829 <sup>417</sup>	58.23	86	41.090 <sup>331</sup>	45.15	136	50.577 <sup>491</sup>	24.78	165
15.7	5.315 <sup>312</sup>	21.07	155	15.246 <sup>410</sup>	57.37	59	41.421 <sup>327</sup>	43.79	134	51.068 <sup>468</sup>	26.43	225
25.7	5.627 <sup>299</sup>	19.52	157	15.656 <sup>393</sup>	56.78	30	41.748 <sup>316</sup>	42.45	127	51.536 <sup>428</sup>	28.68	277
Dec. 5.6	5.926 <sup>278</sup>	17.95	154	16.049 <sup>366</sup>	56.48	0	42.064 <sup>293</sup>	41.18	115	51.964 <sup>374</sup>	31.45	321
15.6	6.204 <sup>246</sup>	16.41	146	16.415 <sup>326</sup>	56.48	32	42.357 <sup>262</sup>	40.03	101	52.338 <sup>310</sup>	34.66	354
25.6	6.450 <sup>207</sup>	14.95	132	16.741 <sup>276</sup>	56.80	62	42.619 <sup>225</sup>	39.02	83	52.648 <sup>232</sup>	38.20	375
35.6	6.657	13.63		17.017	57.42		42.844	38.19		52.880	41.95	
Mean Place	0.915	31.93		9.656	79.70		36.816	58.31		48.714	31.56	
Sec $\delta$ , Tan $\delta$	1.014	+0.166		1.378	+0.948		1.055	+0.336		1.955	-1.680	
$D\psi\alpha$ , $D\omega\alpha$	+0.06	+0.01		+0.08	+0.04		+0.07	+0.01		+0.02	-0.06	
$D\psi\delta$ , $D\omega\delta$	-0.2	+0.8		-0.2	+0.8		-0.2	+0.8		-0.2	+0.8	

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 Monocerotis. Mag. 4.0		$\theta$ Chamæleontis. Mag. 4.3		$\sigma$ Ursæ Majoris. Mag. 3.5		Groombridge 1450. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 21	° ' " - 3 38	h m 8 23	° ' " -77 12	h m 8 23	° ' " +60 59	h m 8 27	° ' " +38 17
	s "	s "	s "	s "	s "	s "	s "	s "
Jan. 0.6	33.077 181	7.88 200	13.60 27	55.33 380	27.29 34	38.51 168	34.451 242	58.47 42
10.5	33.258 134	9.88 185	13.87 8	59.13 390	27.63 24	40.19 195	34.693 184	58.89 70
20.5	33.392 85	11.73 166	13.95 12	63.03 388	42.14 15	34.877 214	34.877 121	59.59 90
30.5	33.477 33	13.39 146	13.83 30	66.91 376	28.02 5	44.28 223	34.998 57	60.49 106
Feb. 9.5	33.510 15	14.85 121	13.53 46	70.67 354	28.07 5	46.51 223	35.055 6	61.55 117
19.4	33.495 58	16.06 98	13.07 62	74.21 327	28.02 14	48.74 212	35.049 63	62.72 120
Mar. 1.4	33.437 95	17.04 74	12.45 74	77.48 291	27.88 21	50.86 193	34.986 114	63.92 116
11.4	33.342 125	17.78 52	11.71 84	80.39 249	27.67 28	52.79 164	34.872 153	65.08 107
21.4	33.217 143	18.30 29	10.87 93	82.88 203	27.39 33	54.43 130	34.719 180	66.15 91
31.3	33.074 154	18.59 10	9.94 98	84.91 155	27.06 35	55.73 90	34.539 198	67.06 72
Apr. 10.3	32.920 156	18.69 10	8.96 101	86.46 103	26.71 37	56.63 48	34.341 202	67.78 51
20.3	32.764 149	18.59 29	7.95 102	87.49 49	26.34 85	57.11 3	34.139 195	68.29 25
30.2	32.615 136	18.30 45	6.93 99	87.98 4	25.99 33	57.14 40	33.944 180	68.54 1
May 10.2	32.479 115	17.85 60	5.94 95	87.94 57	25.66 30	56.74 88	33.764 154	68.55 23
20.2	32.364 90	17.25 75	4.99 88	87.37 108	25.36 24	55.91 121	33.610 124	68.32 46
30.2	32.274 65	16.50 86	4.11 80	86.29 157	25.12 19	54.70 156	33.486 88	67.86 68
June 9.1	32.209 34	15.64 97	3.31 69	84.72 199	24.93 13	53.14 185	33.398 51	67.18 86
19.1	32.175 5	14.67 105	2.62 55	82.73 237	24.80 5	51.29 211	33.347 10	66.32 102
29.1	32.170 27	13.62 109	2.07 42	80.36 270	24.75 1	49.18 230	33.337 30	65.30 118
July 9.1	32.197 57	12.53 109	1.65 27	77.66 292	24.76 8	46.88 245	33.367 70	64.12 129
19.0	32.254 86	11.44 105	1.38 11	74.74 307	24.84 14	44.43 254	33.437 109	62.83 139
29.0	32.340 115	10.39 97	1.27 6	71.67 311	24.98 20	41.89 259	33.546 145	61.44 147
Aug. 8.0	32.455 143	9.42 85	1.33 22	68.56 304	25.18 27	39.30 257	33.691 182	59.97 154
17.9	32.598 171	8.57 66	1.55 40	65.52 289	25.45 33	36.73 283	33.873 215	58.43 158
27.9	32.769 197	7.91 44	1.95 55	62.63 280	25.78 38	34.20 243	34.088 247	56.85 160
Sept. 6.9	32.966 222	7.47 17	2.50 70	60.03 222	26.16 44	31.77 229	34.335 277	55.25 161
16.9	33.188 244	7.30 13	3.20 82	57.81 175	26.60 47	29.48 210	34.612 307	53.64 160
26.8	33.432 267	7.43 45	4.02 92	56.06 121	27.07 51	27.38 188	34.919 331	52.04 157
Oct. 6.8	33.699 284	7.88 78	4.94 100	54.85 59	27.58 55	25.50 160	35.250 355	50.47 150
16.8	33.983 300	8.66 111	5.94 103	54.26 8	28.13 57	23.90 129	35.605 372	48.97 139
26.8	34.283 309	9.77 140	6.97 105	54.34 73	28.70 58	22.61 95	35.977 386	47.58 126
Nov. 5.7	34.592 311	11.17 167	8.02 101	55.07 140	29.28 59	21.66 55	36.363 391	46.32 107
15.7	34.903 307	12.84 187	9.03 94	56.47 200	29.87 58	21.11 15	36.754 388	45.25 86
25.7	35.210 296	14.71 202	9.97 85	58.47 256	30.45 51	20.96 28	37.142 375	44.39 32
Dec. 5.6	35.506 274	16.73 211	10.82 70	61.03 304	31.00 51	21.24 71	37.517 350	43.79 32
15.6	35.780 243	18.84 211	11.52 56	64.07 342	31.51 44	21.95 111	37.867 315	43.47 4
25.6	36.023 205	20.95 206	12.08 38	67.49 368	31.95 39	23.06 148	38.182 271	43.43 26
35.6	36.228	23.01	12.46	71.17	32.34	24.54	38.453	43.69
Mean Place	30.868	5.42	9.121	62.21	22.930	48.78	31.536	67.19
Sec $\delta$ , Tan $\delta$	1.002	-0.064	4.520	-4.409	2.063	+1.804	1.274	+0.790
$D\psi\alpha$ , $D_w\alpha$	+0.06	0.00	-0.03	-0.17	+0.10	+0.07	+0.08	+0.03
$D\psi\delta$ , $D_w\delta$	-0.2	+0.8	-0.2	+0.8	-0.2	+0.8	-0.2	+0.8

Washington Mean Time.	77 Cancr. Mag. 5.5		Groombridge 1446. Mag. 6.3		δ Hydræ. Mag. 4.2		σ Hydræ. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 27	° ' " +20 43	h m 8 30	° ' " +73 54	h m 8 33	° ' " + 5 59	h m 8 34	° ' " + 3 37
	s "	s "	s "	s "	s "	s "	s "	s "
Jan. 0.6	57.185	19.66	37.62	65.01	18.077	33.91	27.474	57.15
10.6	57.396 <sup>211</sup>	19.05	38.16	67.19 <sup>218</sup>	18.276 <sup>199</sup>	32.41 <sup>150</sup>	27.673 <sup>199</sup>	55.52 <sup>163</sup>
20.5	57.557 <sup>161</sup>	18.65	38.55	69.65 <sup>246</sup>	18.429 <sup>153</sup>	31.08 <sup>133</sup>	27.825 <sup>152</sup>	54.06 <sup>146</sup>
30.5	57.664 <sup>107</sup>	18.48	38.77	72.31 <sup>266</sup>	18.532 <sup>103</sup>	29.97 <sup>111</sup>	27.927 <sup>102</sup>	52.80 <sup>126</sup>
Feb. 9.5	57.716 <sup>52</sup>	18.49	38.83	75.04 <sup>273</sup>	18.583 <sup>51</sup>	29.07 <sup>90</sup>	27.978 <sup>51</sup>	51.74 <sup>106</sup>
	0	19	11	270	1	69	2	83
19.4	57.716	18.68	38.72	77.74	18.584	28.38	27.980	50.91
Mar. 1.4	57.667 <sup>49</sup>	18.99	38.45	80.28 <sup>254</sup>	18.540 <sup>44</sup>	27.89 <sup>49</sup>	27.937 <sup>43</sup>	50.30 <sup>61</sup>
11.4	57.576 <sup>91</sup>	19.38	38.05	82.57 <sup>229</sup>	18.457 <sup>83</sup>	27.59 <sup>30</sup>	27.855 <sup>82</sup>	49.88 <sup>24</sup>
21.4	57.452 <sup>124</sup>	19.82	37.54	84.50 <sup>193</sup>	18.343 <sup>114</sup>	27.45 <sup>14</sup>	27.741 <sup>114</sup>	49.64 <sup>42</sup>
31.3	57.306 <sup>146</sup>	20.27	36.95	86.00 <sup>150</sup>	18.209 <sup>134</sup>	27.45 <sup>0</sup>	27.607 <sup>134</sup>	49.56 <sup>8</sup>
	160	43	66	102	148	12	147	7
Apr. 10.3	57.146	20.70	36.29	87.02	18.061	27.57	27.460	49.63
20.3	56.984 <sup>162</sup>	21.08	35.61	87.53 <sup>51</sup>	17.909 <sup>152</sup>	27.81 <sup>24</sup>	27.309 <sup>151</sup>	49.83 <sup>20</sup>
30.3	56.827 <sup>157</sup>	21.41	34.94	87.50 <sup>3</sup>	17.763 <sup>146</sup>	28.12 <sup>31</sup>	27.163 <sup>146</sup>	50.13 <sup>30</sup>
May 10.2	56.685 <sup>142</sup>	21.64	34.30	86.96 <sup>54</sup>	17.629 <sup>134</sup>	28.50 <sup>38</sup>	27.029 <sup>134</sup>	50.52 <sup>39</sup>
20.2	56.565 <sup>120</sup>	21.81	33.71	85.92 <sup>104</sup>	17.513 <sup>116</sup>	28.95 <sup>45</sup>	26.914 <sup>115</sup>	51.00 <sup>48</sup>
	96	9	52	152	93	49	94	55
30.2	56.469	21.90	33.19	84.40	17.420	29.44	26.820	51.55
June 9.1	56.404 <sup>65</sup>	21.91	32.77	82.49 <sup>191</sup>	17.355 <sup>65</sup>	29.98 <sup>54</sup>	26.753 <sup>67</sup>	52.16 <sup>61</sup>
19.1	56.370 <sup>34</sup>	21.85	32.46	80.20 <sup>229</sup>	17.317 <sup>38</sup>	30.54 <sup>56</sup>	26.713 <sup>40</sup>	52.82 <sup>66</sup>
29.1	56.368 <sup>2</sup>	21.72	32.27	77.61 <sup>259</sup>	17.309 <sup>8</sup>	31.12 <sup>58</sup>	26.704 <sup>9</sup>	53.51 <sup>69</sup>
July 9.1	56.400 <sup>32</sup>	21.50	32.19	74.80 <sup>281</sup>	17.332 <sup>23</sup>	31.70 <sup>58</sup>	26.725 <sup>21</sup>	54.20 <sup>69</sup>
	65	28	5	296	52	54	50	67
19.0	56.465	21.22	32.24	71.84	17.384	32.24	26.775	54.87
29.0	56.560 <sup>95</sup>	20.85	32.41	68.76 <sup>308</sup>	17.466 <sup>82</sup>	32.73 <sup>49</sup>	26.855 <sup>80</sup>	55.49 <sup>62</sup>
Aug. 8.0	56.687 <sup>127</sup>	20.40	32.69	65.67 <sup>309</sup>	17.577 <sup>111</sup>	33.13 <sup>40</sup>	26.963 <sup>108</sup>	56.02 <sup>53</sup>
18.0	56.843 <sup>156</sup>	19.85						

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Cancri. Mag. 4.7			$\delta$ Cancri. Mag. 4.2			$\alpha$ Pyxidis. Mag. 3.7			$\epsilon$ Cancri. Mag. 4.2		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	"	h m	s	"	h m	s	"	h m	s	"
	8 38		+21 45	8 39		+18 27	8 40		-32 53	8 41		+29 3
Jan. 0.6	31.613	56.93	60	60.655	29.68	81	17.498	9.40	1330	43.335	43.04	18
10.6	31.835	56.33	37	60.874	28.87	58	17.691	12.70	327	43.571	42.86	7
20.5	32.007	55.96	14	61.044	28.29	36	17.830	15.97	317	43.755	42.93	31
30.5	32.126	55.82	6	61.162	27.93	14	17.913	19.14	297	43.884	43.24	51
Feb. 9.5	32.190	55.88	25	61.226	27.79	3	17.939	22.11	274	43.955	43.75	67
19.4	32.201	56.13	37	61.237	27.82	20	17.911	24.85	242	43.968	44.42	77
Mar. 1.4	32.162	56.50	46	61.200	28.02	30	17.833	27.27	208	43.928	45.19	82
11.4	32.079	56.96	52	61.120	28.32	38	17.713	29.35	171	43.842	46.01	81
21.4	31.962	57.48	52	61.006	28.70	42	17.559	31.06	131	43.718	46.82	76
31.3	31.820	58.00	49	60.869	29.12	42	17.381	32.37	92	43.568	47.58	65
Apr. 10.3	31.664	58.49	44	60.717	29.54	40	17.187	33.29	49	43.400	48.23	54
20.3	31.502	58.93	37	60.560	29.94	36	16.987	33.78	8	43.227	48.77	39
30.3	31.345	59.30	28	60.407	30.30	30	16.789	33.86	32	43.058	49.16	22
May 10.2	31.200	59.58	18	60.266	30.60	24	16.601	33.54	71	42.901	49.38	6
20.2	31.074	59.76	9	60.144	30.84	18	16.430	32.83	109	42.763	49.44	9
30.2	30.972	59.85	0	60.045	31.02	11	16.282	31.74	141	42.652	49.35	27
June 9.1	30.899	59.85	9	59.974	31.13	5	16.159	30.33	172	42.570	49.08	40
19.1	30.856	59.76	18	59.931	31.18	3	16.065	28.61	197	42.519	48.68	53
29.1	30.846	59.58	28	59.920	31.15	9	16.003	26.64	217	42.503	48.15	67
July 9.1	30.868	59.30	35	59.941	31.06	17	15.976	24.47	229	42.521	47.48	77
19.0	30.921	58.95	45	59.992	30.89	27	15.985	22.18	235	42.573	46.71	88
29.0	31.008	58.50	55	60.075	30.62	36	16.029	19.83	233	42.660	45.83	98
Aug. 8.0	31.125	57.95	64	60.187	30.26	46	16.109	17.50	222	42.779	44.85	108
18.0	31.270	57.31	77	60.328	29.80	59	16.227	15.28	202	42.930	43.77	118
27.9	31.445	56.54	88	60.498	29.21	73	16.381	13.26	174	43.111	42.59	125
Sept. 6.9	31.648	55.66	99	60.696	28.48	86	16.570	11.52	138	43.322	41.34	133
16.9	31.877	54.67	112	60.919	27.62	101	16.795	10.14	96	43.561	40.01	140
26.8	32.133	53.55	123	61.168	26.61	115	17.051	9.18	47	43.828	38.61	146
Oct. 6.8	32.412	52.32	133	61.440	25.46	128	17.338	8.71	6	44.121	37.15	149
16.8	32.713	50.99	140	61.736	24.18	139	17.650	8.77	60	44.437	35.66	148
26.8	33.031	49.59	144	62.048	22.79	146	17.980	9.37	115	44.773	34.18	144
Nov. 5.7	33.363	48.15	143	62.374	21.33	149	18.323	10.52	167	45.123	32.74	136
15.7	33.702	46.72	138	62.708	19.84	147	18.670	12.19	215	45.481	31.38	123
25.7	34.041	45.34	129	63.041	18.37	141	19.012	14.34	256	45.839	30.15	106
Dec. 5.7	34.371	44.05	113	63.366	16.96	129	19.339	16.90	288	46.188	29.09	85
15.6	34.682	42.92	96	63.672	15.67	112	19.640	19.78	312	46.518	28.24	60
25.6	34.965	41.96	73	63.952	14.55	94	19.906	22.90	324	46.818	27.64	34
35.6	35.210	41.23		64.193	13.61		20.127	26.14		47.080	27.30	
Mean Place	29.155	64.17		58.256	36.47		15.384	11.68		40.736	51.60	
Sec $\delta$ , Tan $\delta$	1.077	+0.399		1.054	+0.334		1.191	-0.647		1.144	+0.556	
$D\psi\alpha$ , $D_w\alpha$	+0.07	+0.02		+0.07	+0.01		+0.05	-0.03		+0.87	+0.82	
$D\psi\delta$ , $D_w\delta$	-0.3	+0.8		-0.3	+0.8		-0.3	+0.8		-0.3	+0.8	



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Hydræ. Mag. 3.5		δ Argus. Mag. 2.0		σ <sup>2</sup> Cancri (mean). Mag. 5.5		ζ Hydræ. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 42	° ' " + 6 43	h m 8 42	° ' " - 54 24	h m 8 49	° ' " + 30 53	h m 8 51	° ' " + 6 15
	s	"	s	"	s	"	s	"
Jan. 0.6	25.176	22.07	26.884	8.94	13.700	31.17	2.708	38.69
10.6	25.384 <sup>208</sup>	20.58 <sup>149</sup>	27.099 <sup>215</sup>	12.70 <sup>376</sup>	13.947 <sup>247</sup>	31.05 <sup>12</sup>	2.923 <sup>215</sup>	37.15 <sup>154</sup>
20.5	25.545 <sup>161</sup>	19.28 <sup>130</sup>	27.239 <sup>140</sup>	16.53 <sup>383</sup>	14.143 <sup>196</sup>	31.20 <sup>15</sup>	3.093 <sup>170</sup>	35.79 <sup>136</sup>
30.5	25.657 <sup>112</sup>	18.19 <sup>109</sup>	27.302 <sup>63</sup>	20.33 <sup>380</sup>	14.281 <sup>138</sup>	31.60 <sup>40</sup>	3.213 <sup>120</sup>	34.66 <sup>113</sup>
Feb. 9.5	25.717 <sup>60</sup>	17.31 <sup>88</sup>	27.288 <sup>14</sup>	23.99 <sup>366</sup>	14.361 <sup>80</sup>	32.21 <sup>61</sup>	3.281 <sup>68</sup>	33.73 <sup>93</sup>
	11	66	86	343	22	78	19	69
19.5	25.728	16.65	27.202	27.42	14.383	32.99	3.300	33.04
Mar. 1.4	25.692 <sup>36</sup>	16.19 <sup>46</sup>	27.052 <sup>150</sup>	30.56 <sup>314</sup>	14.351 <sup>32</sup>	33.86 <sup>87</sup>	3.272 <sup>28</sup>	32.55 <sup>49</sup>
11.4	25.617 <sup>75</sup>	15.93 <sup>26</sup>	26.844 <sup>208</sup>	33.35 <sup>279</sup>	14.269 <sup>82</sup>	34.79 <sup>93</sup>	3.203 <sup>69</sup>	32.26 <sup>29</sup>
21.4	25.509 <sup>108</sup>	15.81 <sup>12</sup>	26.590 <sup>254</sup>	35.72 <sup>37</sup>	14.149 <sup>120</sup>	35.70 <sup>91</sup>	3.103 <sup>100</sup>	32.13 <sup>13</sup>
31.3	25.379 <sup>130</sup>	15.84 <sup>3</sup>	26.300 <sup>290</sup>	37.64 <sup>192</sup>	14.001 <sup>148</sup>	36.56 <sup>86</sup>	2.977 <sup>126</sup>	32.15 <sup>2</sup>
	145	15	313	144	168	74	141	13
Apr. 10.3	25.234	15.99	25.987	39.08	13.833	37.30	2.836	32.28
20.3	25.085 <sup>149</sup>	16.24 <sup>25</sup>	25.664 <sup>323</sup>	40.01 <sup>93</sup>	13.658 <sup>175</sup>	37.90 <sup>60</sup>	2.690 <sup>146</sup>	32.53 <sup>25</sup>
30.3	24.939 <sup>146</sup>	16.55 <sup>31</sup>	25.338 <sup>326</sup>	40.44 <sup>43</sup>	13.485 <sup>173</sup>	38.35 <sup>45</sup>	2.546 <sup>144</sup>	32.85 <sup>32</sup>
May 10.2	24.804 <sup>135</sup>	16.93 <sup>38</sup>	25.021 <sup>317</sup>	40.36 <sup>8</sup>	13.324 <sup>161</sup>	38.60 <sup>25</sup>	2.411 <sup>135</sup>	33.24 <sup>39</sup>
20.2	24.687 <sup>117</sup>	17.37 <sup>44</sup>	24.724 <sup>297</sup>	39.78 <sup>58</sup>	13.179 <sup>145</sup>	38.67 <sup>7</sup>	2.292 <sup>119</sup>	33.69 <sup>45</sup>
	97	48	273	106	118	11	99	48
30.2	24.590	17.85	24.451	38.72	13.061	38.56	2.193	34.17
June 9.2	24.520 <sup>70</sup>	18.36 <sup>51</sup>	24.212 <sup>239</sup>	37.21 <sup>151</sup>	12.970 <sup>91</sup>	38.26 <sup>30</sup>	2.119 <sup>74</sup>	34.69 <sup>52</sup>
19.1	24.476 <sup>44</sup>	18.88 <sup>52</sup>	24.012 <sup>200</sup>	35.30 <sup>191</sup>	12.913 <sup>57</sup>	37.81 <sup>45</sup>	2.070 <sup>49</sup>	35.24 <sup>55</sup>
29.1	24.462 <sup>14</sup>	19.41 <sup>53</sup>	23.857 <sup>155</sup>	33.03 <sup>227</sup>	12.889 <sup>24</sup>	37.20 <sup>61</sup>	2.050 <sup>20</sup>	35.78 <sup>54</sup>
July 9.1	24.478 <sup>16</sup>	19.93 <sup>52</sup>	23.751 <sup>106</sup>	30.47 <sup>256</sup>	12.899 <sup>10</sup>	36.45 <sup>75</sup>	2.057 <sup>7</sup>	36.31 <sup>53</sup>
	45	49	52	277	45	88	37	50
19.0	24.523	20.42	23.699	27.70	12.944	35.57	2.094	36.81
29.0	24.597 <sup>74</sup>	20.84 <sup>42</sup>	23.700 <sup>1</sup>	24.80 <sup>290</sup>	13.023 <sup>79</sup>	34.58 <sup>99</sup>	2.160 <sup>66</sup>	37.25 <sup>44</sup>
Aug. 8.0	24.698 <sup>101</sup>	21.17 <sup>33</sup>	23.759 <sup>59</sup>	21.87 <sup>293</sup>	13.136 <sup>113</sup>	33.47 <sup>111</sup>	2.254 <sup>94</sup>	37.60 <sup>35</sup>
18.0	24.828 <sup>130</sup>	21.39 <sup>22</sup>	23.875 <sup>116</sup>	19.00 <sup>287</sup>	13.280 <sup>144</sup>	32.25 <sup>122</sup>	2.375 <sup>121</sup>	37.81 <sup>21</sup>
27.9	24.986 <sup>158</sup>	21.45 <sup>6</sup>	24.049 <sup>174</sup>	16.31 <sup>269</sup>	13.457 <sup>177</sup>	30.96 <sup>129</sup>	2.523 <sup>148</sup>	37.89 <sup>8</sup>
	184	11	233	242	207	138	177	11
Sept. 6.9	25.170	21.34	24.282	13.89	13.664	29.58	2.700	37.78
16.9	25.380 <sup>210</sup>	21.01 <sup>33</sup>	24.567 <sup>285</sup>	11.84 <sup>205</sup>	13.900 <sup>236</sup>	28.12 <sup>146</sup>	2.903 <sup>203</sup>	37.45 <sup>33</sup>
26.9	25.615 <sup>235</sup>	20.46 <sup>55</sup>	24.902 <sup>335</sup>	10.26 <sup>158</sup>	14.166 <sup>266</sup>	26.60 <sup>152</sup>	3.131 <sup>228</sup>	36.90 <sup>55</sup>
Oct. 6.8	25.874 <sup>259</sup>	19.66 <sup>80</sup>	25.280 <sup>378</sup>	9.22 <sup>104</sup>	14.457 <sup>291</sup>	25.04 <sup>156</sup>	3.386 <sup>255</sup>	36.10 <sup>80</sup>
16.8	26.155 <sup>281</sup>	18.64 <sup>102</sup>	25.693 <sup>413</sup>	8.78 <sup>44</sup>	14.774 <sup>317</sup>	23.47 <sup>157</sup>	3.662 <sup>276</sup>	35.06 <sup>104</sup>
	298	126	440	19	337	154	296	127
26.8	26.453	17.38	26.133	8.97	15.111	21.93	3.958	33.79
Nov. 5.7	26.764 <sup>311</sup>	15.93 <sup>145</sup>	26.586 <sup>453</sup>	9.81 <sup>84</sup>	15.466 <sup>355</sup>	20.43 <sup>150</sup>	4.269 <sup>311</sup>	32.32 <sup>147</sup>
15.7	27.083 <sup>319</sup>	14.31 <sup>162</sup>	27.041 <sup>455</sup>	11.29 <sup>148</sup>	15.829 <sup>363</sup>	19.03 <sup>140</sup>	4.588 <sup>319</sup>	30.68 <sup>164</sup>
25.7	27.402 <sup>319</sup>	12.60 <sup>171</sup>	27.481 <sup>440</sup>	13.36 <sup>207</sup>	16.194 <sup>365</sup>	17.78 <sup>125</sup>	4.909 <sup>321</sup>	28.93 <sup>175</sup>
Dec. 5.7	27.711 <sup>309</sup>	10.83 <sup>177</sup>	27.896 <sup>415</sup>	15.96 <sup>290</sup>	16.550 <sup>356</sup>	16.72 <sup>106</sup>	5.223 <sup>314</sup>	27.12 <sup>151</sup>
	293	177	374	306	340	84	296	180
15.6	28.004	9.06	28.270	19.02	16.890	15.88	5.519	25.32
25.6	28.269 <sup>265</sup>	7.37 <sup>169</sup>	28.589 <sup>319</sup>	22.43 <sup>341</sup>	17.200 <sup>310</sup>	15.32 <sup>56</sup>	5.790 <sup>271</sup>	23.57 <sup>175</sup>
35.6	28.499 <sup>230</sup>	5.80 <sup>157</sup>	28.847 <sup>258</sup>	26.08 <sup>365</sup>	17.472 <sup>272</sup>	15.04 <sup>28</sup>	6.028 <sup>238</sup>	21.96 <sup>161</sup>
Mean Place	22.940	26.95	24.502	14.47	11.090	40.50	0.503	43.81
Sec δ, Tan δ	1.007	+0.118	1.718	-1.397	1.165	+0.598	1.006	+0.110
D <sub>ψ</sub> α, D <sub>ω</sub> α	+0.06	+0.01	+0.03	-0.06	+0.07	+0.03	+0.06	0.00
D <sub>ψ</sub> δ, D <sub>ω</sub> δ	-0.3	+0.8	-0.3	+0.8	-0.3	+0.7	-0.3	+0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Ursæ Majoris. Mag. 3.1		$\alpha$ Cancr. Mag. 4.3		$\delta^1$ Carinæ. Mag. 5.1		$\kappa$ Ursæ Majoris. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 8 53	° ' " +48 21	h m 8 53	° ' " +12 10	h m 8 54	° ' " -58 54	h m 8 57	° ' " +47 28
	s	"	s	"	s	"	s	"
Jan. 0.6	35.169	54.22	59.255	40.55	58.955	25.15	61.141	56.04
10.6	35.473 <sup>304</sup>	55.04 <sup>82</sup>	59.478 <sup>223</sup>	39.34 <sup>121</sup>	59.203 <sup>248</sup>	28.92 <sup>377</sup>	61.446 <sup>305</sup>	56.79 <sup>75</sup>
20.5	35.712 <sup>239</sup>	56.19 <sup>115</sup>	59.655 <sup>177</sup>	38.33 <sup>101</sup>	59.369 <sup>166</sup>	32.80 <sup>388</sup>	61.689 <sup>243</sup>	57.86 <sup>107</sup>
30.5	35.880 <sup>168</sup>	57.59 <sup>140</sup>	59.783 <sup>128</sup>	37.55 <sup>78</sup>	59.451 <sup>82</sup>	36.68 <sup>388</sup>	61.863 <sup>174</sup>	59.20 <sup>124</sup>
Feb. 9.5	35.973 <sup>93</sup>	59.19 <sup>160</sup>	59.858 <sup>75</sup>	36.98 <sup>57</sup>	59.448 <sup>3</sup>	40.46 <sup>378</sup>	61.963 <sup>100</sup>	60.75 <sup>155</sup>
	21 <sup>172</sup>		23 <sup>23</sup>	34 <sup>34</sup>	83 <sup>360</sup>		28 <sup>169</sup>	
19.5	35.994	60.91	59.881	36.64	59.365	44.06	61.991	62.44
Mar. 1.4	35.944 <sup>50</sup>	62.66 <sup>175</sup>	59.857 <sup>24</sup>	36.49 <sup>15</sup>	59.206 <sup>159</sup>	47.39 <sup>333</sup>	61.949 <sup>42</sup>	64.16 <sup>172</sup>
11.4	35.832 <sup>112</sup>	64.34 <sup>168</sup>	59.791 <sup>66</sup>	36.49 <sup>0</sup>	58.985 <sup>221</sup>	50.38 <sup>299</sup>	61.846 <sup>103</sup>	65.86 <sup>170</sup>
21.4	35.668 <sup>164</sup>	65.90 <sup>156</sup>	59.692 <sup>99</sup>	36.63 <sup>14</sup>	58.708 <sup>277</sup>	52.97 <sup>259</sup>	61.692 <sup>154</sup>	67.41 <sup>155</sup>
31.4	35.465 <sup>203</sup>	67.25 <sup>135</sup>	59.566 <sup>126</sup>	36.88 <sup>25</sup>	58.391 <sup>317</sup>	55.12 <sup>215</sup>	61.498 <sup>194</sup>	68.78 <sup>137</sup>
	229 <sup>108</sup>		140 <sup>30</sup>	347 <sup>168</sup>			221 <sup>112</sup>	
Apr. 10.3	35.236	68.33	59.426	37.18	58.044	56.80	61.277	69.90
20.3	34.994 <sup>242</sup>	69.11 <sup>78</sup>	59.279 <sup>147</sup>	37.53 <sup>35</sup>	57.678 <sup>366</sup>	57.98 <sup>118</sup>	61.043 <sup>234</sup>	70.72 <sup>82</sup>
30.3	34.752 <sup>242</sup>	69.56 <sup>45</sup>	59.133 <sup>146</sup>	37.90 <sup>37</sup>	57.308 <sup>370</sup>	58.65 <sup>67</sup>	60.807 <sup>236</sup>	71.22 <sup>50</sup>
May 10.2	34.521 <sup>231</sup>	69.66 <sup>10</sup>	58.996 <sup>137</sup>	38.28 <sup>38</sup>	56.942 <sup>300</sup>	58.80 <sup>15</sup>	60.582 <sup>225</sup>	71.38 <sup>16</sup>
20.2	34.313 <sup>208</sup>	69.42 <sup>24</sup>	58.875 <sup>121</sup>	38.66 <sup>38</sup>	56.591 <sup>351</sup>	58.42 <sup>38</sup>	60.378 <sup>204</sup>	71.20 <sup>18</sup>
	170 <sup>58</sup>		101 <sup>37</sup>		325 <sup>87</sup>		176 <sup>50</sup>	
30.2	34.134 <sup>144</sup>	68.84 <sup>88</sup>	58.774 <sup>75</sup>	39.03 <sup>34</sup>	56.266 <sup>292</sup>	57.55 <sup>135</sup>	60.202 <sup>142</sup>	70.70 <sup>82</sup>
June 9.2	33.990 <sup>102</sup>	67.96 <sup>117</sup>	58.699 <sup>50</sup>	39.37 <sup>31</sup>	55.974 <sup>252</sup>	56.20 <sup>179</sup>	60.060 <sup>103</sup>	69.88 <sup>111</sup>
19.1	33.888 <sup>58</sup>	66.79 <sup>142</sup>	58.649 <sup>21</sup>	39.68 <sup>28</sup>	55.722 <sup>205</sup>	54.41 <sup>217</sup>	59.957 <sup>60</sup>	68.77 <sup>135</sup>
29.1	33.830 <sup>14</sup>	65.37 <sup>164</sup>	58.628 <sup>6</sup>	39.96 <sup>22</sup>	55.517 <sup>152</sup>	52.24 <sup>250</sup>	59.897 <sup>16</sup>	67.42 <sup>159</sup>
July 9.1	33.816 <sup>33</sup>	63.73 <sup>182</sup>	58.634 <sup>37</sup>	40.18 <sup>17</sup>	55.365 <sup>95</sup>	49.74 <sup>274</sup>	59.881 <sup>28</sup>	65.83 <sup>176</sup>
19.1	33.849 <sup>78</sup>	61.91 <sup>196</sup>	58.671 <sup>66</sup>	40.35 <sup>9</sup>	55.270 <sup>32</sup>	47.00 <sup>291</sup>	59.909 <sup>72</sup>	64.07 <sup>191</sup>
29.0	33.927 <sup>122</sup>	59.95 <sup>209</sup>	58.737 <sup>94</sup>	40.44 <sup>1</sup>	55.238 <sup>30</sup>	44.09 <sup>298</sup>	59.981 <sup>116</sup>	62.16 <sup>204</sup>
Aug. 8.0	34.049 <sup>166</sup>	57.86 <sup>216</sup>	58.831 <sup>123</sup>	40.43 <sup>13</sup>	55.268 <sup>97</sup>	41.11 <sup>294</sup>	60.097 <sup>158</sup>	60.12 <sup>213</sup>
18.0	34.215 <sup>208</sup>	55.70 <sup>200</sup>	58.954 <sup>150</sup>	40.30 <sup>28</sup>	55.365 <sup>165</sup>	38.17 <sup>284</sup>	60.255 <sup>200</sup>	57.99 <sup>218</sup>
27.9	34.423 <sup>249</sup>	53.50 <sup>221</sup>	59.104 <sup>178</sup>	40.02 <sup>43</sup>	55.530 <sup>231</sup>	35.35 <sup>258</sup>	60.455 <sup>241</sup>	55.81 <sup>230</sup>
Sept. 6.9	34.672	51.29	59.282	39.59	55.761	32.77	60.696	53.61
16.9	34.960 <sup>288</sup>	49.10 <sup>219</sup>	59.487 <sup>205</sup>	38.97 <sup>62</sup>	56.056 <sup>295</sup>	30.54 <sup>223</sup>	60.974 <sup>278</sup>	51.42 <sup>219</sup>
26.9	35.283 <sup>323</sup>	46.98 <sup>212</sup>	59.719 <sup>232</sup>	38.16 <sup>81</sup>	56.410 <sup>354</sup>	28.75 <sup>179</sup>	61.290 <sup>316</sup>	49.29 <sup>213</sup>
Oct. 6.8	35.642 <sup>359</sup>	44.95 <sup>263</sup>	59.976 <sup>257</sup>	37.16 <sup>100</sup>	56.816 <sup>406</sup>	27.49 <sup>126</sup>	61.640 <sup>350</sup>	47.24 <sup>205</sup>
16.8	36.033 <sup>391</sup>	43.05 <sup>190</sup>	60.256 <sup>280</sup>	35.96 <sup>120</sup>	57.265 <sup>449</sup>	26.83 <sup>66</sup>	62.021 <sup>381</sup>	45.32 <sup>192</sup>
	415 <sup>170</sup>		301 <sup>137</sup>		462 <sup>5</sup>		409 <sup>175</sup>	
26.8	36.448	41.35	60.557	34.59	57.747	26.78	62.430	43.57
Nov. 5.8	36.884 <sup>436</sup>	39.87 <sup>148</sup>	60.872 <sup>315</sup>	33.08 <sup>151</sup>	58.247 <sup>500</sup>	27.39 <sup>61</sup>	62.859 <sup>429</sup>	42.05 <sup>152</sup>
15.7	37.333 <sup>449</sup>	38.68 <sup>119</sup>	61.197 <sup>325</sup>	31.46 <sup>162</sup>	58.752 <sup>505</sup>	28.67 <sup>128</sup>	63.301 <sup>442</sup>	40.79 <sup>126</sup>
25.7	37.781 <sup>448</sup>	37.80 <sup>88</sup>	61.525 <sup>328</sup>	29.80 <sup>166</sup>	59.243 <sup>491</sup>	30.57 <sup>190</sup>	63.745 <sup>444</sup>	39.83 <sup>96</sup>
Dec. 5.7	38.221 <sup>440</sup>	37.27 <sup>53</sup>	61.846 <sup>321</sup>	28.14 <sup>166</sup>	59.710 <sup>467</sup>	33.01 <sup>244</sup>	64.182 <sup>437</sup>	39.23 <sup>60</sup>
	418 <sup>15</sup>		304 <sup>160</sup>		421 <sup>296</sup>		416 <sup>23</sup>	
15.6	38.639	37.12	62.150	26.54	60.131	35.97	64.598	39.00
25.6	39.021 <sup>382</sup>	37.35 <sup>23</sup>	62.431 <sup>281</sup>	25.05 <sup>149</sup>	60.497 <sup>306</sup>	39.31 <sup>334</sup>	64.980 <sup>382</sup>	39.16 <sup>16</sup>
35.6	39.355 <sup>334</sup>	37.96 <sup>61</sup>	62.676 <sup>245</sup>	23.72 <sup>133</sup>	60.790 <sup>293</sup>	42.93 <sup>362</sup>	65.315 <sup>335</sup>	39.69 <sup>53</sup>
Mean Place	31.958	66.23	56.993	46.93	56.499	31.66	57.998	68.31
Sec $\delta$ , Tan $\delta$	1.505	+1.125	1.023	+0.216	1.937	-1.658	1.480	+1.091
$D\psi\alpha$ , $D\omega\alpha$	+0.08	+0.05	+0.07	+0.01	+0.03	-0.08	+0.08	+0.05
$D\psi\delta$ , $D\omega\delta$	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\sigma^2$ Ursæ Majoris. Mag. 4.9		$\kappa$ Cancrī. Mag. 5.1		$\lambda$ Argus. Mag. 2.2		$\theta$ Hydræ. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 3	° ' " +67 27	h m 9 3	° ' " +10 59	h m 9 4	° ' " -43 5	h m 9 10	° ' " + 2 39
	s	"	s	"	s	"	s	"
Jan. 0.6	11.57	67.01	17.436	63.93	58.647	45.37	4.965	49.51
10.6	12.05	68.67	17.666	62.60	58.877	48.90	5.193	47.71
20.6	12.43	70.70	17.851	61.50	59.049	52.49	5.378	46.10
30.5	12.69	72.99	17.986	60.62	59.159	56.03	5.515	44.68
Feb. 9.5	12.82	75.48	18.070	59.97	59.204	59.46	5.601	43.50
19.5	12.84	78.04	18.103	59.54	59.190	62.69	5.637	42.54
Mar. 1.4	12.74	80.56	18.088	59.32	59.119	65.64	5.626	41.82
11.4	12.54	82.93	18.031	59.27	58.998	68.25	5.575	41.31
21.4	12.23	85.06	17.939	59.36	58.835	70.50	5.488	41.00
31.4	11.85	86.85	17.820	59.58	58.642	72.34	5.375	40.87
Apr. 10.3	11.42	88.24	17.685	59.87	58.426	73.75	5.246	40.90
20.3	10.97	89.18	17.541	60.22	58.198	74.70	5.107	41.06
30.3	10.50	89.63	17.397	60.60	57.965	75.19	4.967	41.34
May 10.3	10.04	89.60	17.260	61.00	57.737	75.23	4.834	41.72
20.2	9.61	89.08	17.139	61.41	57.522	74.81	4.714	42.19
30.2	9.23	88.09	17.035	61.81	57.324	73.95	4.609	42.73
June 9.2	8.91	86.67	16.955	62.20	57.151	72.68	4.525	43.32
19.1	8.65	84.86	16.899	62.56	57.005	71.04	4.466	43.96
29.1	8.46	82.70	16.871	62.89	56.892	69.06	4.432	44.62
July 9.1	8.35	80.27	16.870	63.17	56.814	66.82	4.423	45.29
19.1	8.33	77.59	16.898	63.38	56.775	64.38	4.443	45.93
29.0	8.38	74.75	16.954	63.53	56.775	61.80	4.488	46.52
Aug. 8.0	8.53	71.80	17.039	63.57	56.818	59.18	4.562	47.03
18.0	8.74	68.79	17.152	63.49	56.906	56.62	4.663	47.42
28.0	9.04	65.78	17.292	63.25	57.038	54.19	4.793	47.64
Sept. 6.9	9.41	62.84	17.461	62.85	57.214	52.01	4.952	47.68
16.9	9.85	60.00	17.657	62.27	57.434	50.16	5.137	47.49
26.9	10.36	57.34	17.881	61.48	57.696	48.73	5.351	47.05
Oct. 6.8	10.94	54.90	18.132	60.49	57.997	47.79	5.591	46.34
16.8	11.56	52.75	18.405	59.29	58.331	47.39	5.857	45.37
26.8	12.22	50.92	18.700	57.91	58.692	47.58	6.145	44.12
Nov. 5.8	12.92	49.48	19.013	56.38	59.071	48.37	6.452	42.63
15.7	13.63	48.48	19.336	54.72	59.459	49.76	6.770	40.93
25.7	14.35	47.94	19.663	53.00	59.845	51.70	7.092	39.09
Dec. 5.7	15.06	47.89	19.986	51.27	60.218	54.13	7.410	37.14
15.6	15.72	48.35	20.293	49.58	60.564	56.98	7.714	35.15
25.6	16.32	49.30	20.578	48.01	60.873	60.17	7.996	33.20
35.6	16.85	50.70	20.829	46.58	61.135	63.59	8.246	31.33
Mean Place	6.642	81.53	15.224	70.48	56.550	49.80	2.860	54.55
Sec $\delta$ , Tan $\delta$	2.610	+2.411	1.019	+0.194	1.369	-0.936	1.001	+0.047
$D\psi\alpha$ , $D_w\alpha$	+0.11	+0.12	+0.06	+0.01	+0.04	-0.04	+0.06	0.00
$D\psi\delta$ , $D_w\delta$	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7

# APPARENT PLACES OF STARS, 1917.

393

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Argus. Mag. 1.8		$\delta$ Cancr. Mag. 6.6		$\epsilon$ Argus. Mag. 2.2		$\gamma$ Lynceis. Mag. 3.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 12	° ' " -69 22	h m 9 14	° ' " +18 3	h m 9 14	° ' " -58 55	h m 9 16	° ' " +34 44
	s	"	s	"	s	"	s	"
Jan. 0.6	20.56	22.50	23.394	19.83	54.335	28.40	2.790	27.64
10.6	20.91	26.19	23.641	18.84	54.621	32.08	3.070	27.56
20.6	21.14	30.07	23.843	18.12	54.829	35.93	3.299	27.82
30.5	21.26	34.03	23.995	17.64	54.952	39.82	3.472	28.36
Feb. 9.5	21.27	37.97	24.094	17.41	54.991	43.65	3.584	29.16
19.5	21.16	41.79	24.139	17.40	54.948	47.34	3.634	30.15
Mar. 1.4	20.93	45.39	24.134	17.59	54.831	50.79	3.627	31.28
11.4	20.62	48.72	24.086	17.92	54.646	53.94	3.567	32.49
21.4	20.23	51.68	23.999	18.35	54.403	56.73	3.463	33.67
31.4	19.77	54.24	23.883	18.85	54.114	59.10	3.326	34.79
Apr. 10.3	19.26	56.34	23.748	19.38	53.791	61.02	3.163	35.80
20.3	18.71	57.94	23.602	19.90	53.444	62.45	2.987	36.64
30.3	18.15	59.03	23.455	20.39	53.067	63.37	2.807	37.27
May 10.3	17.58	59.59	23.314	20.82	52.729	63.76	2.633	37.69
20.2	17.02	59.60	23.185	21.19	52.382	63.65	2.474	37.87
30.2	16.49	59.08	23.074	21.48	52.052	63.03	2.334	37.83
June 9.2	15.99	58.05	22.985	21.67	51.750	61.92	2.221	37.54
19.1	15.54	56.54	22.921	21.79	51.483	60.36	2.136	37.04
29.1	15.15	54.58	22.883	21.81	51.258	58.39	2.062	36.33
July 9.1	14.84	52.24	22.874	21.74	51.081	56.07	2.062	35.44
19.1	14.61	49.58	22.894	21.57	50.958	53.45	2.076	34.37
29.0	14.47	46.70	22.941	21.28	50.893	50.64	2.124	33.13
Aug. 8.0	14.43	43.66	23.018	20.88	50.892	47.71	2.206	31.77
18.0	14.48	40.59	23.124	20.36	50.956	44.77	2.322	30.27
28.0	14.63	37.60	23.257	19.68	51.088	41.91	2.472	28.65
Sept. 6.9	14.90	34.78	23.421	18.86	51.287	39.26	2.655	26.95
16.9	15.26	32.25	23.613	17.89	51.552	36.91	2.872	25.17
26.9	15.72	30.12	23.835	16.74	51.881	34.96	3.121	23.33
Oct. 6.8	16.26	28.47	24.085	15.45	52.265	33.50	3.401	21.46
16.8	16.86	27.39	24.360	14.01	52.700	32.62	3.712	19.60
26.8	17.52	26.94	24.660	12.46	53.172	32.35	4.048	17.78
Nov. 5.8	18.21	27.14	24.979	10.81	53.671	32.72	4.406	16.04
15.7	18.91	28.02	25.310	9.13	54.181	33.76	4.779	14.45
25.7	19.60	29.55	25.648	7.45	54.687	35.42	5.160	13.04
Dec. 5.7	20.26	31.69	25.983	5.85	55.171	37.67	5.538	11.87
15.7	20.85	34.37	26.306	4.35	55.619	40.44	5.902	10.96
25.6	21.37	37.52	26.606	3.02	56.015	43.64	6.241	10.38
35.6	21.79	41.04	26.875	1.91	56.349	47.16	6.544	10.12
Mean Place	17.664	30.83	21.132	28.33	51.990	35.56	0.205	39.40
Sec $\delta$ , Tan $\delta$	2.839	-2.657	1.052	+0.326	1.938	-1.660	1.217	+0.693
$D\psi a$ , $D_{\omega} a$	+0.01	-0.13	+0.07	+0.02	+0.03	-0.08	+0.07	+0.08
$D\psi \delta$ , $D_{\omega} \delta$	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7	-0.3	+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Pyxid. Mag. 4.9		$\alpha$ Hydræ. Mag. 2.2		$h$ Ursæ Majoris. Mag. 3.8		$d$ Ursæ Majoris. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 17	° ' " -25 36	h m 9 23	° ' " - 8 17	h m 9 25	° ' " +63 24	h m 9 27	° ' " +70 11
	s	"	s	"	s	"	s	"
Jan. 0.6	50.847	42.28	32.533	56.32	4.30	76.11	15.32	29.16
10.6	51.078 <sup>281</sup>	45.29 <sup>301</sup>	32.769 <sup>236</sup>	58.65 <sup>233</sup>	4.76 <sup>46</sup>	77.40 <sup>129</sup>	15.90 <sup>58</sup>	30.71 <sup>155</sup>
20.6	51.261 <sup>183</sup>	48.30 <sup>301</sup>	32.960 <sup>191</sup>	60.87 <sup>222</sup>	5.14 <sup>38</sup>	79.10 <sup>170</sup>	16.36 <sup>46</sup>	32.67 <sup>196</sup>
30.5	51.392 <sup>131</sup>	51.23 <sup>293</sup>	33.103 <sup>143</sup>	62.93 <sup>206</sup>	5.42 <sup>28</sup>	81.13 <sup>203</sup>	16.71 <sup>35</sup>	34.97 <sup>230</sup>
Feb. 9.5	51.471 <sup>79</sup>	53.99 <sup>276</sup>	33.196 <sup>93</sup>	64.79 <sup>186</sup>	5.59 <sup>17</sup>	83.40 <sup>227</sup>	16.92 <sup>21</sup>	37.52 <sup>255</sup>
	25	253	44	162	6	242	7	267
19.5	51.496	56.52	33.240	66.41	5.65	85.82	16.99	40.19
Mar. 1.5	51.472 <sup>24</sup>	58.80 <sup>228</sup>	33.238 <sup>2</sup>	67.79 <sup>138</sup>	5.62 <sup>3</sup>	88.28 <sup>246</sup>	16.93 <sup>6</sup>	42.87 <sup>268</sup>
11.4	51.405 <sup>67</sup>	60.77 <sup>197</sup>	33.193 <sup>45</sup>	68.89 <sup>110</sup>	5.49 <sup>13</sup>	90.66 <sup>238</sup>	16.74 <sup>19</sup>	45.44 <sup>257</sup>
21.4	51.303 <sup>102</sup>	62.43 <sup>166</sup>	33.113 <sup>80</sup>	69.75 <sup>86</sup>	5.28 <sup>21</sup>	92.86 <sup>220</sup>	16.45 <sup>29</sup>	47.82 <sup>238</sup>
31.4	51.171 <sup>132</sup>	63.73 <sup>130</sup>	33.006 <sup>107</sup>	70.35 <sup>60</sup>	5.00 <sup>28</sup>	94.81 <sup>195</sup>	16.06 <sup>39</sup>	49.88 <sup>206</sup>
	151	97	126	37	33	159	47	168
Apr. 10.3	51.020	64.70	32.880	70.72	4.67	96.40	15.59	51.56
20.3	50.857 <sup>163</sup>	65.30 <sup>60</sup>	32.743 <sup>137</sup>	70.85 <sup>13</sup>	4.30 <sup>37</sup>	97.60 <sup>120</sup>	15.09 <sup>50</sup>	52.79 <sup>123</sup>
30.3	50.691 <sup>166</sup>	65.54 <sup>24</sup>	32.603 <sup>140</sup>	70.77 <sup>8</sup>	3.91 <sup>39</sup>	98.35 <sup>75</sup>	14.56 <sup>53</sup>	53.53 <sup>74</sup>
May 10.3	50.529 <sup>162</sup>	65.44 <sup>10</sup>	32.467 <sup>136</sup>	70.47 <sup>30</sup>	3.53 <sup>38</sup>	98.63 <sup>28</sup>	14.03 <sup>53</sup>	53.76 <sup>23</sup>
20.2	50.376 <sup>153</sup>	65.01 <sup>43</sup>	32.341 <sup>126</sup>	70.00 <sup>47</sup>	3.16 <sup>37</sup>	98.45 <sup>18</sup>	13.52 <sup>51</sup>	53.49 <sup>27</sup>
	137	77	112	65	33	64	48	78
30.2	50.239	64.24	32.229	69.35	2.83	97.81	13.04	52.71
June 9.2	50.121 <sup>118</sup>	63.18 <sup>106</sup>	32.135 <sup>94</sup>	68.55 <sup>80</sup>	2.54 <sup>29</sup>	96.72 <sup>109</sup>	12.62 <sup>42</sup>	51.46 <sup>125</sup>
19.2	50.023 <sup>98</sup>	61.86 <sup>132</sup>	32.063 <sup>72</sup>	67.62 <sup>93</sup>	2.30 <sup>24</sup>	95.24 <sup>148</sup>	12.27 <sup>35</sup>	49.77 <sup>169</sup>
29.1	49.953 <sup>70</sup>	60.30 <sup>156</sup>	32.013 <sup>50</sup>	66.58 <sup>104</sup>	2.11 <sup>19</sup>	93.40 <sup>184</sup>	11.99 <sup>28</sup>	47.70 <sup>207</sup>
July 9.1	49.911 <sup>42</sup>	58.57 <sup>173</sup>	31.988 <sup>25</sup>	65.46 <sup>112</sup>	1.99 <sup>12</sup>	91.23 <sup>217</sup>	11.79 <sup>20</sup>	45.30 <sup>240</sup>
	15	187	0	115	6	243	11	270
19.1	49.896	56.70	31.988	64.31	1.93	88.80	11.68	42.60
29.0	49.913 <sup>17</sup>	54.76 <sup>194</sup>	32.016 <sup>28</sup>	63.17 <sup>114</sup>	1.94 <sup>1</sup>	86.15 <sup>265</sup>	11.67 <sup>1</sup>	39.70 <sup>290</sup>
Aug. 8.0	49.960 <sup>47</sup>	52.81 <sup>195</sup>	32.071 <sup>55</sup>	62.07 <sup>110</sup>	2.03 <sup>9</sup>	83.34 <sup>281</sup>	11.74 <sup>7</sup>	36.63 <sup>307</sup>
18.0	50.042 <sup>82</sup>	50.94 <sup>187</sup>	32.154 <sup>83</sup>	61.07 <sup>100</sup>	2.18 <sup>15</sup>	80.43 <sup>291</sup>	11.90 <sup>16</sup>	33.46 <sup>317</sup>
28.0	50.157 <sup>115</sup>	49.23 <sup>171</sup>	32.267 <sup>113</sup>	60.23 <sup>84</sup>	2.39 <sup>21</sup>	77.46 <sup>297</sup>	12.15 <sup>25</sup>	30.26 <sup>320</sup>
	148	151	141	62	27	296	34	318
Sept. 6.9	50.305	47.72	32.408	59.61	2.66	74.50	12.49	27.08
16.9	50.487 <sup>182</sup>	46.51 <sup>121</sup>	32.581 <sup>173</sup>	59.24 <sup>37</sup>	3.00 <sup>34</sup>	71.59 <sup>291</sup>	12.92 <sup>43</sup>	24.00 <sup>308</sup>
26.9	50.705 <sup>218</sup>	45.67 <sup>84</sup>	32.783 <sup>202</sup>	59.16 <sup>8</sup>	3.40 <sup>40</sup>	68.79 <sup>280</sup>	13.43 <sup>51</sup>	21.05 <sup>295</sup>
Oct. 6.9	50.953 <sup>248</sup>	45.26 <sup>41</sup>	33.014 <sup>231</sup>	59.42 <sup>26</sup>	3.86 <sup>46</sup>	66.17 <sup>262</sup>	14.01 <sup>58</sup>	18.30 <sup>275</sup>
16.8	51.231 <sup>278</sup>	45.30 <sup>4</sup>	33.273 <sup>259</sup>	60.04 <sup>62</sup>	4.37 <sup>51</sup>	63.76 <sup>241</sup>	14.66 <sup>65</sup>	15.84 <sup>246</sup>
	304	53	283	96	56	211	71	214
26.8	51.535	45.83	33.556	61.00	4.93	61.65	15.37	13.70
Nov. 5.8	51.858 <sup>323</sup>	46.85 <sup>102</sup>	33.860 <sup>304</sup>	62.32 <sup>132</sup>	5.52 <sup>59</sup>	59.88 <sup>177</sup>	16.12 <sup>75</sup>	11.96 <sup>174</sup>
15.7	52.194 <sup>336</sup>	48.34 <sup>149</sup>	34.176 <sup>316</sup>	63.96 <sup>164</sup>	6.14 <sup>62</sup>	58.49 <sup>139</sup>	16.90 <sup>78</sup>	10.65 <sup>131</sup>
25.7	52.533 <sup>339</sup>	50.27 <sup>193</sup>	34.499 <sup>323</sup>	65.87 <sup>191</sup>	6.77 <sup>63</sup>	57.55 <sup>94</sup>	17.70 <sup>80</sup>	9.82 <sup>83</sup>
Dec. 5.7	52.866 <sup>333</sup>	52.57 <sup>230</sup>	34.819 <sup>320</sup>	68.01 <sup>214</sup>	7.39 <sup>62</sup>	57.10 <sup>45</sup>	18.49 <sup>79</sup>	9.51 <sup>31</sup>
	317	262	307	227	60	3	76	23
15.7	53.183	55.19	35.126	70.28	7.99	57.13	19.25	9.74
25.6	53.473 <sup>290</sup>	58.02 <sup>283</sup>	35.413 <sup>287</sup>	72.64 <sup>236</sup>	8.55 <sup>56</sup>	57.67 <sup>54</sup>	19.96 <sup>71</sup>	10.50 <sup>76</sup>
35.6	53.727 <sup>254</sup>	60.99 <sup>297</sup>	35.668 <sup>255</sup>	74.99 <sup>235</sup>	9.05 <sup>50</sup>	58.68 <sup>101</sup>	20.59 <sup>63</sup>	11.76 <sup>126</sup>
Mean Place	48.883	43.41	30.551	53.44	0.187	92.34	10.177	46.05
Sec $\delta$ , Tan $\delta$	1.109	-0.480	1.011	-0.146	2.235	+1.999	2.951	+2.776
$D\psi\alpha$ , $D\omega\alpha$	+0.05	-0.02	+0.06	-0.01	+0.09	+0.10	+0.11	+0.15
$D\psi\delta$ , $D\omega\delta$	-0.3	+0.7	-0.3	+0.6	-0.3	+0.6	-0.3	+0.6

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Ursæ Majoris. Mag. 3.3		$\psi$ Argus. Mag. 3.6		$\xi$ Leonis. Mag. 5.1		10 Leonis Minoris. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 27	° ' " +52 2	h m 9 27	° ' " -40 6	h m 9 27	° ' " +11 39	h m 9 29	° ' " +36 45
	s	"	s	"	s	"	s	"
Jan. 0.6	22.095	67.88	27.659	7.23	30.570	57.20	11.219	47.55
10.6	22.454 <sup>359</sup>	68.61 <sup>73</sup>	27.913 <sup>254</sup>	10.61 <sup>338</sup>	30.821 <sup>251</sup>	55.81 <sup>139</sup>	11.517 <sup>298</sup>	47.50 <sup>5</sup>
20.6	22.750 <sup>296</sup>	69.73 <sup>112</sup>	28.112 <sup>199</sup>	14.09 <sup>348</sup>	31.028 <sup>207</sup>	54.67 <sup>114</sup>	11.765 <sup>248</sup>	47.80 <sup>30</sup>
30.5	22.973 <sup>223</sup>	71.18 <sup>145</sup>	28.253 <sup>141</sup>	17.56 <sup>347</sup>	31.187 <sup>159</sup>	53.76 <sup>91</sup>	11.955 <sup>190</sup>	48.41 <sup>61</sup>
Feb. 9.5	23.119 <sup>146</sup>	72.91 <sup>173</sup>	28.334 <sup>81</sup>	20.93 <sup>337</sup>	31.295 <sup>108</sup>	53.10 <sup>66</sup>	12.085 <sup>130</sup>	49.29 <sup>88</sup>
	67	190	22	319	58	43	68	111
19.5	23.186	74.81	28.356	24.12	31.353	52.67	12.153	50.40
Mar. 1.5	23.175 <sup>11</sup>	76.80 <sup>199</sup>	28.322 <sup>34</sup>	27.07 <sup>295</sup>	31.361 <sup>8</sup>	52.47 <sup>20</sup>	12.160 <sup>7</sup>	51.65 <sup>125</sup>
11.4	23.095 <sup>80</sup>	78.78 <sup>198</sup>	28.238 <sup>84</sup>	29.71 <sup>264</sup>	31.325 <sup>36</sup>	52.46 <sup>1</sup>	12.113 <sup>47</sup>	52.98 <sup>133</sup>
21.4	22.952 <sup>143</sup>	80.67 <sup>189</sup>	28.112 <sup>126</sup>	32.02 <sup>231</sup>	31.252 <sup>73</sup>	52.61 <sup>15</sup>	12.019 <sup>94</sup>	54.31 <sup>133</sup>
31.4	22.761 <sup>191</sup>	82.36 <sup>169</sup>	27.953 <sup>159</sup>	33.93 <sup>191</sup>	31.151 <sup>101</sup>	52.88 <sup>27</sup>	11.887 <sup>132</sup>	55.58 <sup>127</sup>
	229	145	184	151	123	36	160	113
Apr. 10.3	22.532	83.81	27.769	35.44	31.028	53.24	11.727	56.71
20.3	22.280 <sup>252</sup>	84.94 <sup>113</sup>	27.570 <sup>199</sup>	36.53 <sup>109</sup>	30.893 <sup>135</sup>	53.65 <sup>41</sup>	11.552 <sup>175</sup>	57.68 <sup>97</sup>
30.3	22.018 <sup>262</sup>	85.72 <sup>78</sup>	27.363 <sup>207</sup>	37.18 <sup>65</sup>	30.754 <sup>139</sup>	54.09 <sup>44</sup>	11.370 <sup>182</sup>	58.43 <sup>75</sup>
May 10.3	21.760 <sup>258</sup>	86.12 <sup>40</sup>	27.156 <sup>207</sup>	37.39 <sup>21</sup>	30.619 <sup>135</sup>	54.55 <sup>46</sup>	11.191 <sup>179</sup>	58.94 <sup>51</sup>
20.2	21.514 <sup>246</sup>	86.14 <sup>2</sup>	26.956 <sup>200</sup>	37.16 <sup>23</sup>	30.494 <sup>125</sup>	55.00 <sup>45</sup>	11.024 <sup>167</sup>	59.19 <sup>25</sup>
	222	37	186	64	109	42	150	0
30.2	21.292	85.77	26.770	36.52	30.385	55.42	10.874	59.19
June 9.2	21.099 <sup>193</sup>	85.03 <sup>74</sup>	26.603 <sup>167</sup>	35.48 <sup>104</sup>	30.293 <sup>92</sup>	55.81 <sup>39</sup>	10.749 <sup>125</sup>	58.92 <sup>27</sup>
19.2	20.945 <sup>154</sup>	83.94 <sup>109</sup>	26.458 <sup>145</sup>	34.06 <sup>142</sup>	30.225 <sup>68</sup>	56.17 <sup>36</sup>	10.651 <sup>98</sup>	58.42 <sup>50</sup>
29.1	20.831 <sup>114</sup>	82.54 <sup>140</sup>	26.341 <sup>117</sup>	32.31 <sup>175</sup>	30.180 <sup>45</sup>	56.47 <sup>30</sup>	10.583 <sup>68</sup>	57.68 <sup>74</sup>
July 9.1	20.761 <sup>70</sup>	80.85 <sup>169</sup>	26.255 <sup>86</sup>	30.28 <sup>203</sup>	30.161 <sup>19</sup>	56.70 <sup>23</sup>	10.549 <sup>34</sup>	56.72 <sup>96</sup>
	24	193	54	224	6	16	2	116
19.1	20.737	78.92	26.201	28.04	30.167	56.86	10.547	55.56
29.0	20.759 <sup>22</sup>	76.77 <sup>215</sup>	26.183 <sup>18</sup>	25.64 <sup>240</sup>	30.201 <sup>34</sup>	56.93 <sup>7</sup>	10.579 <sup>32</sup>	54.23 <sup>133</sup>
Aug. 8.0	20.829 <sup>70</sup>	74.47 <sup>230</sup>	26.204 <sup>21</sup>	23.18 <sup>246</sup>	30.263 <sup>62</sup>	56.89 <sup>4</sup>	10.646 <sup>67</sup>	52.73 <sup>150</sup>
18.0	20.946 <sup>117</sup>	72.03 <sup>244</sup>	26.266 <sup>62</sup>	20.74 <sup>244</sup>	30.351 <sup>88</sup>	56.71 <sup>18</sup>	10.748 <sup>102</sup>	51.09 <sup>164</sup>
28.0	21.109 <sup>163</sup>	69.50 <sup>253</sup>	26.370 <sup>104</sup>	18.40 <sup>234</sup>	30.468 <sup>117</sup>	56.38 <sup>33</sup>	10.884 <sup>136</sup>	49.33 <sup>176</sup>
	210	258	146	213	145	49	172	185
Sept. 6.9	21.319	66.92	26.516	16.27	30.613	55.89	11.056	47.47
16.9	21.574 <sup>255</sup>	64.35 <sup>257</sup>	26.705 <sup>189</sup>	14.44 <sup>183</sup>	30.789 <sup>176</sup>	55.20 <sup>69</sup>	11.263 <sup>207</sup>	45.52 <sup>195</sup>
26.9	21.874 <sup>300</sup>	61.82 <sup>253</sup>	26.937 <sup>232</sup>	12.98 <sup>146</sup>	30.994 <sup>205</sup>	54.32 <sup>88</sup>	11.503 <sup>240</sup>	43.52 <sup>203</sup>
Oct. 6.9	22.216 <sup>342</sup>	59.37 <sup>245</sup>	27.210 <sup>273</sup>	11.98 <sup>100</sup>	31.227 <sup>233</sup>	53.22 <sup>110</sup>	11.778 <sup>275</sup>	41.49 <sup>208</sup>
16.8	22.598 <sup>382</sup>	57.06 <sup>231</sup>	27.519 <sup>309</sup>	11.50 <sup>48</sup>	31.488 <sup>261</sup>	51.93 <sup>129</sup>	12.085 <sup>307</sup>	39.48 <sup>201</sup>
	417	211	338	6	285	147	335	106
26.8	23.015	54.95	27.857	11.56	31.773	50.46	12.420	37.52
Nov. 5.8	23.460 <sup>445</sup>	53.07 <sup>188</sup>	28.220 <sup>363</sup>	12.21 <sup>65</sup>	32.080 <sup>307</sup>	48.82 <sup>164</sup>	12.781 <sup>361</sup>	35.65 <sup>187</sup>
15.7	23.927 <sup>467</sup>	51.50 <sup>157</sup>	28.597 <sup>377</sup>	13.43 <sup>122</sup>	32.402 <sup>322</sup>	47.08 <sup>174</sup>	13.159 <sup>378</sup>	33.95 <sup>170</sup>
25.7	24.404 <sup>477</sup>	50.29 <sup>121</sup>	28.978 <sup>381</sup>	15.19 <sup>176</sup>	32.732 <sup>330</sup>	45.27 <sup>181</sup>	13.548 <sup>389</sup>	32.45 <sup>150</sup>
Dec. 5.7	24.880 <sup>476</sup>	49.46 <sup>83</sup>	29.351 <sup>373</sup>	17.45 <sup>226</sup>	33.061 <sup>329</sup>	43.45 <sup>182</sup>	13.936 <sup>388</sup>	31.21 <sup>124</sup>
	462	40	354	269	320	176	378	95
15.7	25.342	49.06	29.705	20.14	33.381	41.69	14.314	30.26
25.6	25.773 <sup>431</sup>	49.10 <sup>4</sup>	30.027 <sup>322</sup>	23.17 <sup>303</sup>	33.680 <sup>299</sup>	40.05 <sup>164</sup>	14.668 <sup>354</sup>	29.65 <sup>61</sup>
35.6	26.161 <sup>388</sup>	49.55 <sup>45</sup>	30.310 <sup>283</sup>	26.45 <sup>328</sup>	33.949 <sup>269</sup>	38.56 <sup>149</sup>	14.989 <sup>321</sup>	29.40 <sup>25</sup>
Mean Place	18.915	83.10	25.682	11.48	28.447	64.89	8.652	60.55
Sec $\delta$ , Tan $\delta$	1.626	+1.282	1.307	-0.842	1.021	+0.206	1.248	+0.747
$D\psi\alpha$ , $D_\omega\alpha$	+0.08	+0.07	+0.05	-0.04	+0.06	+0.01	+0.07	+0.04
$D\psi\delta$ , $D_\omega\delta$	-0.3	+0.6	-0.3	+0.6	-0.3	+0.6	-0.3	+0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Leonis. Mag. 3.8		♋ Antilæ. Mag. 5.0		♉ Leonis. Mag. 3.1		♊ Argus. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 36	° ' +10 15	h m 9 40	° ' -27 23	h m 9 41	° ' +24 8	h m 9 44	° ' -64 41
	s	"	s	"	s	"	s	"
Jan. 0.6	45.437	66.53	31.957	18.68	10.823	73.85	64.05	3.85
10.6	45.693 <sup>256</sup>	65.04 <sup>149</sup>	32.210 <sup>258</sup>	21.71 <sup>303</sup>	11.101 <sup>278</sup>	73.07 <sup>78</sup>	64.43 <sup>38</sup>	7.38 <sup>353</sup>
20.6	45.907 <sup>214</sup>	63.79 <sup>125</sup>	32.418 <sup>208</sup>	24.76 <sup>305</sup>	11.335 <sup>234</sup>	72.57 <sup>50</sup>	64.72 <sup>29</sup>	11.15 <sup>377</sup>
30.5	46.073 <sup>166</sup>	62.77 <sup>102</sup>	32.575 <sup>157</sup>	27.77 <sup>301</sup>	11.521 <sup>186</sup>	72.39 <sup>18</sup>	64.93 <sup>21</sup>	15.06 <sup>391</sup>
Feb. 9.5	46.190 <sup>117</sup>	62.01 <sup>76</sup>	32.678 <sup>108</sup>	30.65 <sup>288</sup>	11.652 <sup>131</sup>	72.48 <sup>9</sup>	65.03 <sup>10</sup>	19.00 <sup>394</sup>
	66	53	51	267	76	34	1	387
19.5	46.256	61.48	32.729	33.32	11.728	72.82	65.04	22.87
Mar. 1.5	46.273 <sup>17</sup>	61.20 <sup>28</sup>	32.730 <sup>1</sup>	35.76 <sup>244</sup>	11.751 <sup>23</sup>	73.36 <sup>54</sup>	64.95 <sup>9</sup>	26.59 <sup>372</sup>
11.4	46.246 <sup>27</sup>	61.11 <sup>9</sup>	32.685 <sup>45</sup>	37.90 <sup>214</sup>	11.725 <sup>26</sup>	74.07 <sup>71</sup>	64.79 <sup>16</sup>	30.06 <sup>347</sup>
21.4	46.181 <sup>65</sup>	61.19 <sup>8</sup>	32.601 <sup>84</sup>	39.74 <sup>184</sup>	11.658 <sup>67</sup>	74.86 <sup>79</sup>	64.55 <sup>24</sup>	33.23 <sup>317</sup>
31.4	46.087 <sup>94</sup>	61.41 <sup>22</sup>	32.486 <sup>115</sup>	41.24 <sup>150</sup>	11.557 <sup>101</sup>	75.70 <sup>84</sup>	64.24 <sup>31</sup>	36.04 <sup>281</sup>
	117	32	137	115	126	83	35	238
Apr. 10.4	45.970	61.73	32.349	42.39	11.431	76.53	63.89	38.42
20.3	45.841 <sup>129</sup>	62.13 <sup>40</sup>	32.197 <sup>152</sup>	43.18 <sup>79</sup>	11.290 <sup>141</sup>	77.31 <sup>78</sup>	63.50 <sup>39</sup>	40.34 <sup>192</sup>
30.3	45.706 <sup>135</sup>	62.57 <sup>44</sup>	32.038 <sup>159</sup>	43.63 <sup>45</sup>	11.142 <sup>148</sup>	77.99 <sup>68</sup>	63.09 <sup>41</sup>	41.77 <sup>143</sup>
May 10.3	45.573 <sup>133</sup>	63.04 <sup>47</sup>	31.878 <sup>160</sup>	43.71 <sup>8</sup>	10.995 <sup>147</sup>	78.57 <sup>58</sup>	62.66 <sup>43</sup>	42.69 <sup>92</sup>
20.2	45.448 <sup>125</sup>	63.51 <sup>47</sup>	31.723 <sup>155</sup>	43.45 <sup>26</sup>	10.856 <sup>139</sup>	79.01 <sup>44</sup>	62.23 <sup>43</sup>	43.08 <sup>39</sup>
	110	46	144	60	124	28	42	15
30.2	45.338	63.97	31.579	42.85	10.732	79.29	61.81	42.93
June 9.2	45.244 <sup>94</sup>	64.40 <sup>43</sup>	31.451 <sup>128</sup>	41.94 <sup>91</sup>	10.625 <sup>107</sup>	79.43 <sup>14</sup>	61.41 <sup>40</sup>	42.27 <sup>66</sup>
19.2	45.172 <sup>72</sup>	64.81 <sup>41</sup>	31.342 <sup>109</sup>	40.74 <sup>120</sup>	10.540 <sup>85</sup>	79.42 <sup>1</sup>	61.06 <sup>36</sup>	41.10 <sup>117</sup>
29.1	45.121 <sup>51</sup>	65.16 <sup>35</sup>	31.254 <sup>88</sup>	39.29 <sup>145</sup>	10.481 <sup>59</sup>	79.24 <sup>18</sup>	60.72 <sup>33</sup>	39.47 <sup>163</sup>
July 9.1	45.095 <sup>26</sup>	65.46 <sup>30</sup>	31.192 <sup>62</sup>	37.62 <sup>167</sup>	10.448 <sup>33</sup>	78.91 <sup>33</sup>	60.44 <sup>28</sup>	37.43 <sup>204</sup>
	2	22	35	182	7	48	22	239
19.1	45.093	65.68	31.157 <sup>8</sup>	35.80 <sup>192</sup>	10.441 <sup>22</sup>	78.43 <sup>64</sup>	60.22 <sup>16</sup>	35.04 <sup>269</sup>
29.1	45.118 <sup>25</sup>	65.83 <sup>15</sup>	31.149 <sup>24</sup>	33.88 <sup>196</sup>	10.463 <sup>50</sup>	77.79 <sup>78</sup>	60.06 <sup>8</sup>	32.35 <sup>287</sup>
Aug. 8.0	45.169 <sup>51</sup>	65.86 <sup>3</sup>	31.173 <sup>57</sup>	31.92 <sup>192</sup>	10.513 <sup>81</sup>	77.01 <sup>93</sup>	59.98 <sup>0</sup>	29.48 <sup>297</sup>
18.0	45.248 <sup>79</sup>	65.75 <sup>11</sup>	31.230 <sup>90</sup>	30.00 <sup>180</sup>	10.594 <sup>111</sup>	76.08 <sup>109</sup>	59.98 <sup>8</sup>	26.51 <sup>297</sup>
28.0	45.356 <sup>108</sup>	65.49 <sup>26</sup>	31.320 <sup>127</sup>	28.20 <sup>160</sup>	10.705 <sup>141</sup>	74.99 <sup>124</sup>	60.06 <sup>16</sup>	23.54 <sup>297</sup>
	135	43	127	160	141	124	16	286
Sept. 6.9	45.491	65.06	31.447	26.60	10.846	73.75	60.22	20.68
16.9	45.657 <sup>166</sup>	64.42 <sup>64</sup>	31.610 <sup>163</sup>	25.26 <sup>134</sup>	11.019 <sup>173</sup>	72.37 <sup>138</sup>	60.47 <sup>25</sup>	18.05 <sup>263</sup>
26.9	45.852 <sup>195</sup>	63.58 <sup>84</sup>	31.810 <sup>200</sup>	24.27 <sup>99</sup>	11.224 <sup>205</sup>	70.84 <sup>153</sup>	60.80 <sup>33</sup>	15.76 <sup>229</sup>
Oct. 6.9	46.077 <sup>225</sup>	62.53 <sup>105</sup>	32.044 <sup>234</sup>	23.68 <sup>59</sup>	11.460 <sup>236</sup>	69.20 <sup>164</sup>	61.21 <sup>41</sup>	13.90 <sup>186</sup>
16.8	46.332 <sup>255</sup>	61.25 <sup>128</sup>	32.313 <sup>269</sup>	23.54 <sup>14</sup>	11.727 <sup>267</sup>	67.45 <sup>175</sup>	61.69 <sup>48</sup>	12.56 <sup>134</sup>
	279	146	298	36	296	181	54	75
26.8	46.611	59.79	32.611	23.90	12.023	65.64	62.23	11.81
Nov. 5.8	46.913 <sup>302</sup>	58.14 <sup>165</sup>	32.932 <sup>321</sup>	24.75 <sup>85</sup>	12.342 <sup>319</sup>	63.79 <sup>185</sup>	62.80 <sup>57</sup>	11.69 <sup>12</sup>
15.8	47.232 <sup>319</sup>	56.38 <sup>176</sup>	33.271 <sup>339</sup>	26.08 <sup>133</sup>	12.680 <sup>338</sup>	61.95 <sup>184</sup>	63.40 <sup>60</sup>	12.24 <sup>55</sup>
25.7	47.561 <sup>329</sup>	54.53 <sup>185</sup>	33.617 <sup>346</sup>	27.87 <sup>179</sup>	13.031 <sup>351</sup>	60.19 <sup>176</sup>	64.01 <sup>61</sup>	13.44 <sup>120</sup>
Dec. 5.7	47.891 <sup>330</sup>	52.66 <sup>187</sup>	33.962 <sup>345</sup>	30.07 <sup>220</sup>	13.382 <sup>351</sup>	58.55 <sup>164</sup>	64.60 <sup>59</sup>	15.27 <sup>183</sup>
	321	184	333	253	345	145	56	241
15.7	48.212	50.82	34.295	32.60	13.727	57.10	65.16	17.68
25.6	48.514 <sup>302</sup>	49.08 <sup>174</sup>	34.604 <sup>309</sup>	35.39 <sup>279</sup>	14.054 <sup>327</sup>	55.87 <sup>123</sup>	65.66 <sup>50</sup>	20.58 <sup>290</sup>
35.6	48.788 <sup>274</sup>	47.50 <sup>158</sup>	34.880 <sup>276</sup>	38.34 <sup>295</sup>	14.351 <sup>297</sup>	54.92 <sup>95</sup>	66.08 <sup>42</sup>	23.88 <sup>330</sup>
Mean Place	43.370	74.25	30.080	20.26	8.593	85.02	61.689	12.71
Sec δ, Tan δ	1.016	+0.181	1.126	-0.518	1.096	+0.448	2.339	-2.115
$D\psi\alpha, D\omega\alpha$	+0.06	+0.01	+0.05	-0.03	+0.07	+0.02	+0.03	-0.12
$D\psi\delta, D\omega\delta$	-0.3	+0.6	-0.3	+0.6	-0.3	+0.6	-0.3	+0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♂ Ursæ Majoris. Mag. 3.9		6 Sextantis. Mag. 6.0		♂ Leonis. Mag. 4.1		Groombridge 1586. Mag. 6.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 45	° ' " +59 25	h m 9 47	° ' " - 3 51	h m 9 48	° ' " +26 23	h m 9 50	° ' " +73 15
	s	"	s	"	s	"	s	"
Jan. 0.6	9.550	30.01	5.048	18.04	4.987	42.48	65.06	70.64
10.6	9.989 <sup>439</sup>	30.93 <sup>92</sup>	5.302 <sup>254</sup>	20.20 <sup>216</sup>	5.274 <sup>287</sup>	41.77 <sup>71</sup>	65.77 <sup>71</sup>	72.05 <sup>141</sup>
20.6	10.357 <sup>368</sup>	32.29 <sup>136</sup>	5.516 <sup>214</sup>	22.24 <sup>204</sup>	5.517 <sup>243</sup>	41.37 <sup>40</sup>	66.36 <sup>59</sup>	73.93 <sup>188</sup>
30.6	10.643 <sup>286</sup>	34.02 <sup>173</sup>	5.685 <sup>169</sup>	24.10 <sup>186</sup>	5.711 <sup>194</sup>	41.29 <sup>8</sup>	66.82 <sup>46</sup>	76.20 <sup>227</sup>
Feb. 9.5	10.839 <sup>196</sup>	36.06 <sup>204</sup>	5.805 <sup>120</sup>	25.73 <sup>163</sup>	5.850 <sup>139</sup>	41.50 <sup>21</sup>	67.13 <sup>31</sup>	78.77 <sup>257</sup>
	102	223	70	141	85	46	14	275
19.5	10.941	38.29	5.875	27.14	5.935	41.96	67.27	81.52
Mar. 1.5	10.952 <sup>11</sup>	40.63 <sup>234</sup>	5.898 <sup>23</sup>	28.29 <sup>115</sup>	5.966 <sup>31</sup>	42.64 <sup>68</sup>	67.27 <sup>0</sup>	84.33 <sup>281</sup>
	75	234	20	92	19	82	16	276
11.4	10.877 <sup>154</sup>	42.97 <sup>222</sup>	5.878 <sup>57</sup>	29.21 <sup>66</sup>	5.947 <sup>64</sup>	43.46 <sup>92</sup>	67.11 <sup>30</sup>	87.09 <sup>258</sup>
21.4	10.723 <sup>217</sup>	45.19 <sup>202</sup>	5.821 <sup>86</sup>	29.87 <sup>44</sup>	5.883 <sup>98</sup>	44.38 <sup>96</sup>	66.81 <sup>41</sup>	89.67 <sup>231</sup>
31.4	10.506 <sup>268</sup>	47.21 <sup>174</sup>	5.735 <sup>108</sup>	30.31 <sup>22</sup>	5.785 <sup>125</sup>	45.34 <sup>94</sup>	66.40 <sup>51</sup>	91.98 <sup>195</sup>
Apr. 10.4	10.238	48.95 <sup>140</sup>	5.627 <sup>123</sup>	30.53 <sup>4</sup>	5.660 <sup>142</sup>	46.28 <sup>86</sup>	65.89 <sup>57</sup>	93.93 <sup>150</sup>
20.3	9.935 <sup>303</sup>	50.35 <sup>98</sup>	5.504 <sup>129</sup>	30.57 <sup>13</sup>	5.518 <sup>150</sup>	47.14 <sup>76</sup>	65.32 <sup>62</sup>	95.43 <sup>102</sup>
30.3	9.613 <sup>322</sup>	51.33 <sup>56</sup>	5.375 <sup>129</sup>	30.44 <sup>30</sup>	5.368 <sup>150</sup>	47.90 <sup>63</sup>	64.70 <sup>64</sup>	96.45 <sup>51</sup>
May 10.3	9.287 <sup>317</sup>	51.89 <sup>34</sup>	5.246 <sup>111</sup>	30.14 <sup>56</sup>	5.218 <sup>131</sup>	48.53 <sup>28</sup>	64.06 <sup>60</sup>	96.96 <sup>57</sup>
20.2	8.970 <sup>285</sup>	52.00 <sup>174</sup>	5.123 <sup>111</sup>	29.70 <sup>56</sup>	5.074 <sup>131</sup>	49.00 <sup>28</sup>	63.43 <sup>60</sup>	98.92 <sup>57</sup>
30.2	8.675	51.66	5.012	29.14	4.943	49.28	62.83	96.35
June 9.2	8.411 <sup>264</sup>	50.90 <sup>76</sup>	4.914 <sup>98</sup>	28.46 <sup>68</sup>	4.831 <sup>112</sup>	49.40 <sup>12</sup>	62.28 <sup>55</sup>	95.28 <sup>107</sup>
19.2	8.185 <sup>226</sup>	49.72 <sup>118</sup>	4.835 <sup>79</sup>	27.69 <sup>77</sup>	4.739 <sup>92</sup>	49.34 <sup>6</sup>	61.79 <sup>49</sup>	93.74 <sup>154</sup>
29.1	8.005 <sup>180</sup>	48.16 <sup>156</sup>	4.775 <sup>60</sup>	26.85 <sup>84</sup>	4.672 <sup>67</sup>	49.09 <sup>25</sup>	61.38 <sup>41</sup>	91.76 <sup>198</sup>
July 9.1	7.876 <sup>129</sup>	46.27 <sup>189</sup>	4.737 <sup>38</sup>	25.98 <sup>87</sup>	4.630 <sup>42</sup>	48.68 <sup>41</sup>	61.06 <sup>32</sup>	89.42 <sup>234</sup>
	77	218	14	89	14	59	22	269
19.1	7.799	44.09	4.723	25.09	4.616	48.09	60.84	86.73
29.1	7.778 <sup>21</sup>	41.65 <sup>244</sup>	4.733 <sup>10</sup>	24.22 <sup>87</sup>	4.631 <sup>15</sup>	47.33 <sup>76</sup>	60.72 <sup>12</sup>	83.77 <sup>296</sup>
Aug. 8.0	7.814 <sup>36</sup>	39.02 <sup>263</sup>	4.769 <sup>36</sup>	23.41 <sup>81</sup>	4.674 <sup>43</sup>	46.41 <sup>92</sup>	60.71 <sup>1</sup>	80.62 <sup>315</sup>
18.0	7.908 <sup>94</sup>	36.24 <sup>278</sup>	4.832 <sup>63</sup>	22.72 <sup>69</sup>	4.748 <sup>74</sup>	45.34 <sup>107</sup>	60.80 <sup>9</sup>	77.33 <sup>329</sup>
28.0	8.060 <sup>152</sup>	33.35 <sup>289</sup>	4.922 <sup>90</sup>	22.16 <sup>56</sup>	4.852 <sup>104</sup>	44.10 <sup>124</sup>	61.00 <sup>20</sup>	73.95 <sup>338</sup>
	209	293	121	37	135	138	31	338
Sept. 6.9	8.269	30.42	5.043	21.79	4.987	42.72	61.31	70.57
16.9	8.535 <sup>266</sup>	27.49 <sup>293</sup>	5.195 <sup>152</sup>	21.67 <sup>12</sup>	5.156 <sup>169</sup>	41.20 <sup>152</sup>	61.71 <sup>40</sup>	67.24 <sup>333</sup>
26.9	8.857 <sup>322</sup>	24.61 <sup>288</sup>	5.377 <sup>182</sup>	21.82 <sup>15</sup>	5.357 <sup>201</sup>	39.54 <sup>166</sup>	62.22 <sup>51</sup>	64.03 <sup>321</sup>
Oct. 6.9	9.233 <sup>376</sup>	21.85 <sup>276</sup>	5.591 <sup>214</sup>	22.25 <sup>43</sup>	5.590 <sup>233</sup>	37.77 <sup>177</sup>	62.82 <sup>60</sup>	61.01 <sup>302</sup>
16.8	9.659 <sup>426</sup>	19.27 <sup>258</sup>	5.835 <sup>244</sup>	23.01 <sup>76</sup>	5.855 <sup>265</sup>	35.92 <sup>185</sup>	63.52 <sup>70</sup>	58.24 <sup>277</sup>
	471	236	271	108	295	191	77	244
26.8	10.130	16.91	6.106	24.09	6.150	34.01	64.29	55.80
Nov. 5.8	10.640 <sup>510</sup>	14.86 <sup>205</sup>	6.402 <sup>296</sup>	25.47 <sup>138</sup>	6.470 <sup>320</sup>	32.09 <sup>192</sup>	65.12 <sup>83</sup>	53.75 <sup>205</sup>
15.8	11.180 <sup>540</sup>	13.15 <sup>171</sup>	6.715 <sup>313</sup>	27.14 <sup>167</sup>	6.811 <sup>341</sup>	30.21 <sup>188</sup>	66.00 <sup>88</sup>	52.14 <sup>161</sup>
25.7	11.736 <sup>556</sup>	11.84 <sup>131</sup>	7.038 <sup>323</sup>	29.03 <sup>189</sup>	7.165 <sup>354</sup>	28.42 <sup>179</sup>	66.91 <sup>91</sup>	51.02 <sup>112</sup>
Dec. 5.7	12.296 <sup>560</sup>	11.00 <sup>84</sup>	7.364 <sup>328</sup>	31.11 <sup>208</sup>	7.522 <sup>357</sup>	26.78 <sup>164</sup>	67.82 <sup>91</sup>	50.44 <sup>58</sup>
	546	35	318	218	351	144	89	0
15.7	12.842	10.65	7.682	33.29	7.873	25.34	68.71	50.44
25.6	13.361 <sup>519</sup>	10.78 <sup>13</sup>	7.982 <sup>300</sup>	35.51 <sup>223</sup>	8.207 <sup>334</sup>	24.16 <sup>118</sup>	69.56 <sup>85</sup>	50.99 <sup>55</sup>
35.6	13.831 <sup>470</sup>	11.41 <sup>63</sup>	8.255 <sup>273</sup>	37.72 <sup>221</sup>	8.513 <sup>306</sup>	23.26 <sup>90</sup>	70.31 <sup>75</sup>	52.09 <sup>110</sup>
Mean Place	6.034	47.52	3.136	13.59	2.755	54.51	59.596	89.75
Sec $\delta$ , Tan $\delta$	1.966	+1.693	1.002	-0.067	1.116	+0.496	3.474	+3.327
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.09	+0.09	+0.06	0.00	+0.07	+0.03	+0.11	+0.19
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.3	+0.6	-0.3	+0.5	-0.3	+0.5	-0.3	+0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	19 Leonis Minoris. Mag. 5.2		$\phi$ Argus. Mag. 3.7		$\pi$ Leonis. Mag. 4.9		$\gamma$ Leonis. Mag. 3.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 9 52	° ' " +41 26	h m 9 53	° ' " -54 10	h m 9 55	° ' " + 8 26	h m 10 2	° ' " +17 9
Jan. 0.6	38.951	50.28	58.764	13.67	51.682	26.75	50.516	54.05
10.6	39.284 333	50.27 1	59.093 329	17.12 345	51.951 269	25.12 163	50.799 283	52.81 124
20.6	39.567 283	50.67 40	59.357 264	20.78 366	52.180 229	23.70 142	51.042 243	51.83 98
30.6	39.794 227	51.44 77	59.551 194	24.55 377	52.363 183	22.53 117	51.239 197	51.15 68
Feb. 9.5	39.958 164	52.54 110	59.672 121	28.33 378	52.498 135	21.61 92	51.386 147	50.74 41
	97	133	46	369	82	65	96	12
19.5	40.055	53.87	59.718	32.02	52.580	20.96	51.482	50.62
Mar. 1.5	40.090 35	55.38 151	59.697 21	35.53 351	52.618 38	20.53 43	51.526 44	50.73 11
11.4	40.065 25	56.99 161	59.611 86	38.80 327	52.609 9	20.34 19	51.524 2	51.06 33
21.4	39.986 79	58.62 163	59.467 144	41.76 296	52.562 47	20.34 0	51.481 43	51.54 48
31.4	39.864 122	60.18 156	59.278 189	44.36 260	52.483 79	20.49 15	51.404 77	52.12 58
	156	143	226	220	103	29	104	65
Apr. 10.4	39.708	61.61	59.052	46.56	52.380	20.78	51.300	52.77
20.3	39.529 179	62.83 122	58.796 256	48.30 174	52.261 119	21.15 37	51.179 121	53.44 67
30.3	39.338 191	63.82 99	58.522 274	49.57 127	52.135 126	21.59 44	51.049 130	54.10 66
May 10.3	39.145 193	64.52 70	58.240 282	50.36 79	52.007 128	22.07 48	50.916 133	54.71 61
20.3	38.957 188	64.93 41	57.957 283	50.66 30	51.885 122	22.57 50	50.788 128	55.26 55
	175	10	276	21	112	50	118	47
30.2	38.782	65.03	57.681	50.45	51.773	23.07	50.670	55.73
June 9.2	38.630 152	64.80 23	57.420 261	49.77 68	51.675 98	23.56 49	50.565 105	56.09 36
19.2	38.503 127	64.29 51	57.180 240	48.62 115	51.594 81	24.03 47	50.476 89	56.34 25
29.1	38.403 100	63.47 82	56.969 211	47.06 156	51.533 61	24.46 43	50.409 67	56.48 14
July 9.1	38.336 67	62.39 106	56.790 179	45.09 197	51.493 40	24.84 38	50.362 47	56.50 2
	34	131	138	226	17	31	22	10
19.1	38.302	61.08	56.652	42.83	51.476	25.15	50.340	56.40
29.1	38.301 1	59.51 157	56.559 93	40.28 255	51.483 7	25.37 22	50.342 2	56.15 25
Aug. 8.0	38.338 37	57.76 175	56.514 45	37.59 269	51.517 34	25.48 11	50.370 28	55.76 39
18.0	38.412 74	55.85 191	56.524 10	34.81 278	51.576 59	25.46 2	50.424 54	55.22 54
28.0	38.523 111	53.77 208	56.591 67	32.05 276	51.663 87	25.27 19	50.508 84	54.50 72
	148	218	126	263	116	36	114	88
Sept. 7.0	38.671	51.59	56.717	29.42	51.779	24.91	50.622	53.62
16.9	38.858 187	49.32 227	56.906 189	27.01 241	51.925 146	24.35 56	50.766 144	52.55 107
26.9	39.084 226	46.99 233	57.154 248	24.93 208	52.102 177	23.55 80	50.943 177	51.29 126
Oct. 6.9	39.349 265	44.65 234	57.460 306	23.29 164	52.312 210	22.53 102	51.151 208	49.86 143
16.8	39.650 301	42.34 231	57.819 359	22.14 115	52.551 239	21.29 124	51.392 241	48.25 161
	335	223	403	58	270	146	273	174
26.8	39.985	40.11	58.222	21.56	52.821	19.83	51.665	46.51
Nov. 5.8	40.351 306	38.01 210	58.661 439	21.60 4	53.115 294	18.17 166	51.964 299	44.66 185
15.8	40.742 391	36.10 191	59.123 462	22.26 66	53.429 314	16.37 180	52.284 320	42.75 191
25.7	41.147 405	34.44 166	59.596 473	23.56 130	53.756 327	14.46 191	52.619 335	40.82 193
Dec. 5.7	41.557 410	33.06 138	60.063 467	25.45 189	54.087 331	12.50 196	52.960 341	38.94 188
	404	102	447	243	327	195	338	178
15.7	41.961	32.04	60.510	27.88	54.414	10.55	53.298	37.16
25.7	42.346 385	31.41 63	60.921 411	30.77 289	54.724 310	8.69 186	53.623 325	35.56 160
35.6	42.701 355	31.18 23	61.284 363	34.02 325	55.010 286	6.95 174	53.922 299	34.17 139
Mean Place	36.398	65.64	56.760	21.11	49.720	34.70	48.496	64.54
Sec $\delta$ , Tan $\delta$	1.334	+0.883	1.708	-1.385	1.011	+0.148	1.047	+0.309
$D\psi a$ , $D_\omega a$	+0.07	+0.05	+0.04	-0.08	+0.06	+0.01	+0.06	+0.02
$D\psi \delta$ , $D_\omega \delta$	-0.3	+0.5	-0.3	+0.5	-0.3	+0.5	-0.3	+0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Leonis. (Regulus.) Mag. 1.3		$\lambda$ Hydræ. Mag. 3.8		$\eta$ Velorum. Mag. 4.1		32 Ursæ Majoris. Mag. 5.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 3	° ' " +12 21	h m 10 6	° ' " -11 56	h m 10 11	° ' " -41 42	h m 10 12	° ' " +65 30
	s	"	s	"	s	"	s	"
Jan. 0.6	59.183	74.71	34.292	38.47	16.664	32.10	5.19	62.69
10.6	59.461 <sup>278</sup>	73.23 <sup>148</sup>	34.559 <sup>267</sup>	40.96 <sup>249</sup>	16.971 <sup>307</sup>	35.32 <sup>322</sup>	5.75 <sup>56</sup>	63.57 <sup>88</sup>
20.6	59.699 <sup>238</sup>	72.00 <sup>123</sup>	34.788 <sup>229</sup>	43.39 <sup>243</sup>	17.228 <sup>257</sup>	38.70 <sup>338</sup>	6.23 <sup>48</sup>	64.96 <sup>139</sup>
30.6	59.892 <sup>193</sup>	71.03 <sup>97</sup>	34.973 <sup>185</sup>	45.70 <sup>231</sup>	17.429 <sup>201</sup>	42.16 <sup>346</sup>	6.61 <sup>38</sup>	66.78 <sup>182</sup>
Feb. 9.5	60.037 <sup>145</sup>	70.34 <sup>69</sup>	35.109 <sup>136</sup>	47.82 <sup>212</sup>	17.571 <sup>142</sup>	45.59 <sup>343</sup>	6.90 <sup>29</sup>	68.96 <sup>218</sup>
	93	43	87	191	84	333	16	243
19.5	60.130	69.91	35.196	49.73	17.655	48.92	7.06	71.39
Mar. 1.5	60.174 <sup>44</sup>	69.73 <sup>18</sup>	35.235 <sup>39</sup>	51.39 <sup>166</sup>	17.681 <sup>26</sup>	52.06 <sup>314</sup>	7.12 <sup>6</sup>	73.99 <sup>260</sup>
11.5	60.174 <sup>0</sup>	69.77 <sup>4</sup>	35.232 <sup>3</sup>	52.80 <sup>141</sup>	17.654 <sup>27</sup>	54.97 <sup>291</sup>	7.08 <sup>4</sup>	76.61 <sup>262</sup>
21.4	60.133 <sup>41</sup>	69.99 <sup>22</sup>	35.189 <sup>43</sup>	53.93 <sup>113</sup>	17.580 <sup>74</sup>	57.57 <sup>260</sup>	6.94 <sup>14</sup>	79.14 <sup>253</sup>
31.4	60.058 <sup>75</sup>	70.35 <sup>36</sup>	35.115 <sup>74</sup>	54.81 <sup>88</sup>	17.466 <sup>114</sup>	59.85 <sup>228</sup>	6.71 <sup>23</sup>	81.50 <sup>236</sup>
	99	45	98	61	144	190	30	207
Apr. 10.4	59.959	70.80	35.017	55.42	17.322	61.75	6.41	83.57
20.3	59.842 <sup>117</sup>	71.32 <sup>52</sup>	34.901 <sup>116</sup>	55.79 <sup>37</sup>	17.153 <sup>169</sup>	63.25 <sup>150</sup>	6.04 <sup>37</sup>	85.29 <sup>172</sup>
30.3	59.717 <sup>125</sup>	71.87 <sup>55</sup>	34.777 <sup>124</sup>	55.91 <sup>12</sup>	16.969 <sup>184</sup>	64.34 <sup>109</sup>	5.65 <sup>39</sup>	86.59 <sup>130</sup>
May 10.3	59.589 <sup>128</sup>	72.43 <sup>56</sup>	34.649 <sup>128</sup>	55.81 <sup>30</sup>	16.776 <sup>193</sup>	65.00 <sup>66</sup>	5.24 <sup>41</sup>	87.43 <sup>84</sup>
20.3	59.464 <sup>125</sup>	72.96 <sup>53</sup>	34.523 <sup>126</sup>	55.49 <sup>12</sup>	16.582 <sup>194</sup>	65.23 <sup>28</sup>	4.83 <sup>41</sup>	87.79 <sup>36</sup>
	114	50	117	51	190	20	40	13
30.2	59.350	73.46	34.406	54.98	16.392	65.03	4.43	87.66
June 9.2	59.247 <sup>103</sup>	73.90 <sup>44</sup>	34.298 <sup>108</sup>	54.28 <sup>70</sup>	16.211 <sup>181</sup>	64.42 <sup>61</sup>	4.06 <sup>37</sup>	87.03 <sup>63</sup>
19.2	59.161 <sup>86</sup>	74.28 <sup>38</sup>	34.205 <sup>93</sup>	53.43 <sup>85</sup>	16.045 <sup>166</sup>	63.40 <sup>102</sup>	3.72 <sup>34</sup>	85.94 <sup>109</sup>
29.2	59.095 <sup>66</sup>	74.59 <sup>31</sup>	34.130 <sup>75</sup>	52.44 <sup>99</sup>	15.897 <sup>148</sup>	62.02 <sup>138</sup>	3.44 <sup>28</sup>	84.42 <sup>152</sup>
July 9.1	59.049 <sup>46</sup>	74.81 <sup>22</sup>	34.073 <sup>57</sup>	51.34 <sup>110</sup>	15.774 <sup>128</sup>	60.31 <sup>171</sup>	3.22 <sup>22</sup>	82.50 <sup>192</sup>
	23	12	36	117	97	198	18	228
19.1	59.026	74.93	34.037	50.17	15.677	58.33	3.04	80.22
29.1	59.026 <sup>0</sup>	74.94 <sup>1</sup>	34.026 <sup>11</sup>	48.97 <sup>120</sup>	15.613 <sup>64</sup>	56.13 <sup>220</sup>	2.93 <sup>11</sup>	77.63 <sup>259</sup>
Aug. 8.0	59.052 <sup>26</sup>	74.83 <sup>11</sup>	34.039 <sup>13</sup>	47.80 <sup>117</sup>	15.583 <sup>30</sup>	53.79 <sup>234</sup>	2.89 <sup>4</sup>	74.81 <sup>282</sup>
18.0	59.103 <sup>51</sup>	74.56 <sup>27</sup>	34.079 <sup>40</sup>	46.69 <sup>111</sup>	15.592 <sup>9</sup>	51.40 <sup>239</sup>	2.92 <sup>3</sup>	71.78 <sup>303</sup>
28.0	59.184 <sup>81</sup>	74.13 <sup>43</sup>	34.148 <sup>69</sup>	45.70 <sup>99</sup>	15.643 <sup>51</sup>	49.03 <sup>237</sup>	3.04 <sup>12</sup>	68.62 <sup>316</sup>
	110	60	100	80	96	225	17	324
Sept. 7.0	59.294	73.53	34.248	44.90	15.739	46.78	3.21	65.98
16.9	59.433 <sup>139</sup>	72.72 <sup>81</sup>	34.381 <sup>133</sup>	44.32 <sup>58</sup>	15.881 <sup>142</sup>	44.76 <sup>202</sup>	3.46 <sup>25</sup>	62.12 <sup>326</sup>
26.9	59.605 <sup>172</sup>	71.72 <sup>100</sup>	34.547 <sup>166</sup>	44.04 <sup>28</sup>	16.071 <sup>190</sup>	43.04 <sup>172</sup>	3.78 <sup>32</sup>	58.90 <sup>322</sup>
Oct. 6.9	59.810 <sup>205</sup>	70.50 <sup>122</sup>	34.748 <sup>201</sup>	44.07 <sup>3</sup>	16.308 <sup>237</sup>	41.71 <sup>133</sup>	4.17 <sup>39</sup>	55.81 <sup>309</sup>
16.9	60.045 <sup>235</sup>	69.08 <sup>142</sup>	34.980 <sup>232</sup>	44.47 <sup>40</sup>	16.588 <sup>280</sup>	40.85 <sup>86</sup>	4.63 <sup>46</sup>	52.88 <sup>293</sup>
	267	161	265	78	321	35	51	268
26.8	60.312	67.47	35.245	45.25	16.909	40.50	5.14	50.20
Nov. 5.8	60.605 <sup>293</sup>	65.72 <sup>175</sup>	35.536 <sup>291</sup>	46.39 <sup>114</sup>	17.264 <sup>355</sup>	40.71 <sup>21</sup>	5.72 <sup>58</sup>	47.82 <sup>238</sup>
15.8	60.920 <sup>315</sup>	63.85 <sup>187</sup>	35.849 <sup>313</sup>	47.89 <sup>150</sup>	17.644 <sup>380</sup>	41.50 <sup>79</sup>	6.34 <sup>62</sup>	45.83 <sup>199</sup>
25.7	61.249 <sup>329</sup>	61.91 <sup>194</sup>	36.175 <sup>326</sup>	49.71 <sup>182</sup>	18.038 <sup>394</sup>	42.84 <sup>134</sup>	6.99 <sup>65</sup>	44.29 <sup>154</sup>
Dec. 5.7	61.584 <sup>335</sup>	59.97 <sup>194</sup>	36.506 <sup>331</sup>	51.80 <sup>209</sup>	18.435 <sup>397</sup>	44.71 <sup>187</sup>	7.65 <sup>66</sup>	43.23 <sup>106</sup>
	332	189	326	229	387	235	65	53
15.7	61.916	58.08	36.832	54.09	18.822	47.06	8.30	42.70
25.7	62.234 <sup>318</sup>	56.31 <sup>177</sup>	37.143 <sup>311</sup>	56.51 <sup>242</sup>	19.186 <sup>364</sup>	49.81 <sup>275</sup>	8.93 <sup>63</sup>	42.73 <sup>3</sup>
35.6	62.527 <sup>293</sup>	54.72 <sup>159</sup>	37.429 <sup>286</sup>	58.99 <sup>248</sup>	19.517 <sup>331</sup>	52.88 <sup>307</sup>	9.52 <sup>59</sup>	43.30 <sup>57</sup>
Mean Place	57.221	83.99	32.504	35.89	14.886	37.28	1.438	82.84
Sec $\delta$ , Tan $\delta$	1.024	+0.219	1.022	-0.212	1.340	-0.891	2.413	+2.196
$D\psi\alpha$ , $D_\omega\alpha$	+0.06	+0.01	+0.06	-0.01	+0.05	-0.05	+0.09	+0.13
$D\psi\delta$ , $D_\omega\delta$	-0.3	+0.5	-0.3	+0.5	-0.4	+0.5	-0.4	+0.5



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\zeta$ Leonis. Mag. 3.6		$\lambda$ Ursæ Majoris. Mag. 3.5		$\gamma$ Leonis pr. Mag. 2.6		$\mu$ Ursæ Majoris. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 12	° ' " +23 49	h m 10 12	° ' " +43 19	h m 10 15	° ' " +20 15	h m 10 17	° ' " +41 54
	s " "	s " "	s " "	s " "	s " "	s " "	s " "	s " "
Jan. 0.7	6.695 <sup>300</sup>	40.55 98	8.364 <sup>356</sup>	29.00 <sup>6</sup>	25.927 <sup>296</sup>	30.89 <sup>116</sup>	25.831 <sup>354</sup>	45.75 <sup>17</sup>
10.6	6.995 <sup>260</sup>	39.57 66	8.720 <sup>309</sup>	28.94 <sup>36</sup>	26.223 <sup>258</sup>	29.73 <sup>88</sup>	26.185 <sup>309</sup>	45.58 <sup>25</sup>
20.6	7.255 <sup>213</sup>	38.91 33	9.029 <sup>253</sup>	29.30 <sup>77</sup>	26.481 <sup>213</sup>	28.85 <sup>55</sup>	26.494 <sup>255</sup>	45.83 <sup>66</sup>
30.6	7.468 <sup>162</sup>	38.58 2	9.282 <sup>190</sup>	30.07 <sup>112</sup>	26.694 <sup>163</sup>	28.30 <sup>24</sup>	26.749 <sup>193</sup>	46.49 <sup>102</sup>
Feb. 9.5	7.630 <sup>109</sup>	38.56 28	9.472 <sup>125</sup>	31.19 <sup>140</sup>	26.857 <sup>111</sup>	28.06 <sup>3</sup>	26.942 <sup>130</sup>	47.51 <sup>132</sup>
19.5	7.739 <sup>56</sup>	38.84 51	9.597 <sup>59</sup>	32.59 <sup>162</sup>	26.968 <sup>60</sup>	28.09 <sup>30</sup>	27.072 <sup>66</sup>	48.83 <sup>154</sup>
Mar. 1.5	7.795 <sup>7</sup>	39.35 72	9.656 <sup>4</sup>	34.21 <sup>174</sup>	27.028 <sup>11</sup>	28.39 <sup>49</sup>	27.138 <sup>5</sup>	50.37 <sup>169</sup>
11.5	7.802 <sup>38</sup>	40.07 85	9.652 <sup>60</sup>	35.95 <sup>178</sup>	27.039 <sup>62</sup>	28.88 <sup>67</sup>	27.143 <sup>52</sup>	52.06 <sup>174</sup>
21.4	7.764 <sup>75</sup>	40.92 92	9.592 <sup>108</sup>	37.73 <sup>174</sup>	27.007 <sup>38</sup>	29.55 <sup>81</sup>	27.091 <sup>98</sup>	53.80 <sup>171</sup>
31.4	7.689 <sup>102</sup>	41.84 94	9.484 <sup>145</sup>	39.47 <sup>160</sup>	26.939 <sup>96</sup>	30.31 <sup>76</sup>	26.993 <sup>136</sup>	55.51 <sup>160</sup>
Apr. 10.4	7.587 <sup>124</sup>	42.78 92	9.339 <sup>174</sup>	41.07 <sup>142</sup>	26.843 <sup>116</sup>	31.12 <sup>81</sup>	26.857 <sup>164</sup>	57.11 <sup>143</sup>
20.4	7.463 <sup>135</sup>	43.70 84	9.165 <sup>190</sup>	42.49 <sup>117</sup>	26.727 <sup>128</sup>	31.93 <sup>78</sup>	26.693 <sup>181</sup>	58.54 <sup>120</sup>
30.3	7.328 <sup>139</sup>	44.54 73	8.975 <sup>197</sup>	43.66 <sup>89</sup>	26.599 <sup>132</sup>	32.71 <sup>70</sup>	26.512 <sup>189</sup>	59.74 <sup>93</sup>
May 10.3	7.189 <sup>137</sup>	45.27 61	8.778 <sup>195</sup>	44.55 <sup>56</sup>	26.467 <sup>131</sup>	33.41 <sup>61</sup>	26.323 <sup>189</sup>	60.67 <sup>62</sup>
20.3	7.052 <sup>129</sup>	45.88 45	8.583 <sup>186</sup>	45.11 <sup>23</sup>	26.336 <sup>123</sup>	34.02 <sup>49</sup>	26.134 <sup>180</sup>	61.29 <sup>30</sup>
30.2	6.923 <sup>115</sup>	46.33 28	8.397 <sup>168</sup>	45.34 <sup>10</sup>	26.213 <sup>110</sup>	34.51 <sup>35</sup>	25.954 <sup>164</sup>	61.59 <sup>2</sup>
June 9.2	6.808 <sup>99</sup>	46.61 12	8.229 <sup>148</sup>	45.24 <sup>42</sup>	26.103 <sup>96</sup>	34.86 <sup>21</sup>	25.790 <sup>145</sup>	61.57 <sup>35</sup>
19.2	6.709 <sup>78</sup>	46.73 6	8.081 <sup>121</sup>	44.82 <sup>76</sup>	26.007 <sup>76</sup>	35.07 <sup>7</sup>	25.645 <sup>120</sup>	61.22 <sup>67</sup>
29.2	6.631 <sup>57</sup>	46.67 25	7.960 <sup>92</sup>	44.06 <sup>106</sup>	25.931 <sup>57</sup>	35.14 <sup>9</sup>	25.525 <sup>93</sup>	60.55 <sup>97</sup>
July 9.1	6.574 <sup>33</sup>	46.42 41	7.868 <sup>60</sup>	43.00 <sup>134</sup>	25.874 <sup>33</sup>	35.05 <sup>25</sup>	25.432 <sup>62</sup>	59.58 <sup>125</sup>
19.1	6.541 <sup>9</sup>	46.01 59	7.808 <sup>26</sup>	41.66 <sup>160</sup>	25.841 <sup>10</sup>	34.80 <sup>40</sup>	25.370 <sup>31</sup>	58.33 <sup>150</sup>
29.1	6.532 <sup>19</sup>	45.42 77	7.782 <sup>9</sup>	40.06 <sup>181</sup>	25.831 <sup>17</sup>	34.40 <sup>57</sup>	25.339 <sup>3</sup>	56.83 <sup>174</sup>
Aug. 8.0	6.551 <sup>46</sup>	44.65 94	7.791 <sup>45</sup>	38.25 <sup>203</sup>	25.848 <sup>43</sup>	33.83 <sup>75</sup>	25.342 <sup>39</sup>	55.09 <sup>194</sup>
18.0	6.597 <sup>76</sup>	43.71 112	7.836 <sup>84</sup>	36.22 <sup>220</sup>	25.891 <sup>102</sup>	33.08 <sup>110</sup>	25.381 <sup>76</sup>	53.15 <sup>214</sup>
28.0	6.673 <sup>107</sup>	42.59 129	7.920 <sup>124</sup>	34.02 <sup>233</sup>	25.963 <sup>73</sup>	32.17 <sup>110</sup>	25.457 <sup>115</sup>	51.01 <sup>227</sup>
Sept. 7.0	6.780 <sup>139</sup>	41.30 146	8.044 <sup>164</sup>	31.69 <sup>244</sup>	26.066 <sup>134</sup>	31.07 <sup>127</sup>	25.572 <sup>154</sup>	48.74 <sup>239</sup>
16.9	6.919 <sup>174</sup>	39.84 162	8.208 <sup>205</sup>	29.25 <sup>250</sup>	26.200 <sup>167</sup>	29.80 <sup>145</sup>	25.726 <sup>195</sup>	46.35 <sup>247</sup>
26.9	7.093 <sup>209</sup>	38.22 176	8.413 <sup>247</sup>	26.75 <sup>253</sup>	26.367 <sup>202</sup>	28.35 <sup>162</sup>	25.921 <sup>235</sup>	43.88 <sup>251</sup>
Oct. 6.9	7.302 <sup>241</sup>	36.46 189	8.660 <sup>288</sup>	24.22 <sup>252</sup>	26.569 <sup>235</sup>	26.73 <sup>176</sup>	26.156 <sup>278</sup>	41.37 <sup>251</sup>
16.9	7.543 <sup>274</sup>	34.57 197	8.948 <sup>325</sup>	21.70 <sup>243</sup>	26.804 <sup>268</sup>	24.97 <sup>189</sup>	26.434 <sup>316</sup>	38.86 <sup>245</sup>
26.8	7.817 <sup>304</sup>	32.60 203	9.273 <sup>362</sup>	19.27 <sup>230</sup>	27.072 <sup>296</sup>	23.08 <sup>197</sup>	26.750 <sup>350</sup>	36.41 <sup>234</sup>
Nov. 5.8	8.121 <sup>328</sup>	30.57 202	9.635 <sup>390</sup>	16.97 <sup>210</sup>	27.368 <sup>320</sup>	21.11 <sup>201</sup>	27.100 <sup>379</sup>	34.07 <sup>214</sup>
15.8	8.449 <sup>344</sup>	28.55 196	10.025 <sup>409</sup>	14.87 <sup>186</sup>	27.688 <sup>338</sup>	19.10 <sup>199</sup>	27.479 <sup>402</sup>	31.93 <sup>192</sup>
25.7	8.793 <sup>354</sup>	26.59 185	10.434 <sup>419</sup>	13.01 <sup>153</sup>	28.026 <sup>347</sup>	17.11 <sup>178</sup>	27.881 <sup>412</sup>	30.01 <sup>161</sup>
Dec. 5.7	9.147 <sup>351</sup>	24.74 166	10.853 <sup>418</sup>	11.48 <sup>116</sup>	28.373 <sup>346</sup>	15.20 <sup>178</sup>	28.292 <sup>412</sup>	28.40 <sup>125</sup>
15.7	9.498 <sup>340</sup>	23.08 144	11.271 <sup>403</sup>	10.32 <sup>76</sup>	28.719 <sup>335</sup>	13.42 <sup>157</sup>	28.704 <sup>398</sup>	27.15 <sup>86</sup>
25.7	9.838 <sup>315</sup>	21.64 115	11.674 <sup>376</sup>	9.56 <sup>32</sup>	29.054 <sup>311</sup>	11.85 <sup>134</sup>	29.102 <sup>373</sup>	26.29 <sup>86</sup>
35.6	10.153	20.49	12.050	9.24	29.365	10.51	29.475	25.86 <sup>43</sup>
Mean Place	4.638	53.14	5.897	45.96	23.938	42.71	23.446	62.74
Sec $\delta$ , Tan $\delta$	1.093	+0.442	1.375	+0.943	1.066	+0.369	1.344	+0.898
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.07	+0.03	+0.07	+0.06	+0.07	+0.02	+0.07	+0.05
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.4	+0.5	-0.4	+0.5	-0.4	+0.4	-0.4	+0.4

## FOR THE UPPER TRANSIT AT WASHINGTON

Washington Mean Time.	30 H. Ursæ Majoris. Mag. 4.9		$\mu$ Hydræ. Mag. 4.1		31 Leonis Minoris. Mag. 4.4		$\alpha$ Antlæ. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 18	° ' " +65 58	h m 10 22	° ' " -16 24	h m 10 23	° ' " +37 7	h m 10 23	° ' " -30 38
	s	"	s	"	s	"	s	"
Jan. 0.7	13.88	51.59	6.239	45.16	7.602	42.12	22.799	40.04
10.6	14.45	52.43	6.521	47.78	7.942	41.66	23.096	43.01
20.6	14.95	53.78	6.764	50.37	8.240	41.63	23.350	46.09
30.6	15.35	55.58	6.963	52.89	8.488	41.99	23.556	49.17
Feb. 9.5	15.64	57.75	7.114	55.26	8.679	42.72	23.711	52.18
19.5	15.83	60.18	7.217	57.42	8.810	43.75	23.813	55.06
Mar. 1.5	15.91	62.79	7.272	59.37	8.881	45.04	23.863	57.75
11.5	15.88	65.44	7.282	61.05	8.895	46.48	23.865	60.20
21.4	15.74	68.02	7.252	62.47	8.857	48.02	23.825	62.35
31.4	15.51	70.43	7.189	63.60	8.775	49.57	23.749	64.20
Apr. 10.4	15.21	72.56	7.101	64.46	8.657	51.05	23.644	65.71
20.4	14.86	74.34	6.994	65.04	8.513	52.40	23.517	66.88
30.3	14.46	75.71	6.873	65.36	8.351	53.57	23.377	67.69
May 10.3	14.04	76.62	6.748	65.42	8.182	54.52	23.227	68.15
20.3	13.62	77.05	6.622	65.23	8.013	55.19	23.076	68.25
30.2	13.22	76.98	6.500	64.81	7.852	55.60	22.928	67.99
June 9.2	12.83	76.42	6.387	64.16	7.702	55.71	22.787	67.39
19.2	12.48	75.38	6.285	63.32	7.570	55.52	22.657	66.49
29.2	12.18	73.90	6.197	62.30	7.460	55.06	22.543	65.29
July 9.1	11.94	72.02	6.128	61.13	7.374	54.31	22.447	63.83
19.1	11.75	69.76	6.077	59.86	7.316	53.31	22.373	62.15
29.1	11.63	67.19	6.049	58.53	7.286	52.05	22.323	60.32
Aug. 8.1	11.57	64.37	6.045	57.18	7.285	50.56	22.303	58.40
18.0	11.58	61.33	6.069	55.87	7.318	48.87	22.313	56.45
28.0	11.67	58.14	6.121	54.67	7.385	47.00	22.356	54.54
Sept. 7.0	11.83	54.87	6.205	53.63	7.488	44.95	22.438	52.77
16.9	12.08	51.57	6.323	52.81	7.627	42.76	22.559	51.22
26.9	12.39	48.31	6.477	52.26	7.805	40.47	22.721	49.95
Oct. 6.9	12.77	45.14	6.666	52.05	8.022	38.09	22.924	49.04
16.9	13.22	42.16	6.892	52.21	8.279	35.68	23.168	48.55
26.8	13.73	39.40	7.152	52.77	8.574	33.29	23.448	48.53
Nov. 5.8	14.30	36.96	7.440	53.72	8.902	30.97	23.761	49.02
15.8	14.92	34.89	7.753	55.07	9.259	28.78	24.099	49.99
25.8	15.58	33.27	8.082	56.78	9.637	26.78	24.455	51.44
Dec. 5.7	16.25	32.13	8.419	58.81	10.027	25.04	24.817	53.34
15.7	16.91	31.53	8.754	61.09	10.418	23.60	25.175	55.64
25.7	17.56	31.48	9.075	63.56	10.799	22.53	25.517	58.26
35.6	18.16	32.00	9.372	66.13	11.155	21.85	25.831	61.11
Mean Place	10.162	72.23	4.536	43.67	5.378	58.41	21.115	42.55
Sec $\delta$ , Tan $\delta$	2.457	+2.244	1.043	-0.295	1.254	+0.757	1.163	-0.593
$D\psi\alpha$ , $D\omega\alpha$	+0.09	+0.14	+0.06	-0.02	+0.07	+0.05	+0.05	-0.04
$D\psi\delta$ , $D\omega\delta$	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	36 Ursæ Majoris. Mag. 4.8		9 H. Draconis. Mag. 5.0		ρ Leonis. Mag. 3.8		33 Sextantis. Mag. 6.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 25	° ' " +56 23	h m 10 28	° ' " +76 7	h m 10 28	° ' " + 9 43	h m 10 37	° ' " - 1 18
	s 10 25	" +56 23	s 10 28	" +76 7	s 10 28	" + 9 43	s 10 37	" - 1 18
Jan. 0.7	22.448	63.78	10.19	65.99	28.369	53.58	12.528	23.06
10.6	22.900	64.16	11.11	67.07	28.659	51.91	12.817	25.17
20.6	23.295	65.03	11.90	68.68	28.914	50.46	13.072	27.15
30.6	23.621	66.36	12.55	70.77	29.128	49.27	13.287	28.95
Feb. 9.6	23.871	68.08	13.04	73.23	29.295	48.35	13.456	30.51
19.5	24.038	70.11	13.35	75.98	29.413	47.72	13.578	31.84
Mar. 1.5	24.120	72.34	13.46	78.88	29.483	47.35	13.653	32.90
11.5	24.120	74.67	13.40	81.81	29.506	47.23	13.684	33.70
21.4	24.045	77.00	13.15	84.64	29.489	47.31	13.674	34.27
31.4	23.904	79.23	12.76	87.26	29.438	47.57	13.632	34.62
Apr. 10.4	23.709	81.26	12.24	89.59	29.359	47.95	13.562	34.76
20.4	23.472	83.01	11.61	91.51	29.260	48.43	13.472	34.73
30.3	23.206	84.44	10.89	92.97	29.148	48.97	13.368	34.54
May 10.3	22.925	85.47	10.14	93.91	29.029	49.54	13.257	34.22
20.3	22.641	86.08	9.37	94.32	28.912	50.12	13.144	33.80
30.3	22.364	86.26	8.60	94.19	28.798	50.68	13.034	33.29
June 9.2	22.105	86.00	7.86	93.51	28.693	51.20	12.930	32.70
19.2	21.869	85.30	7.17	92.31	28.600	51.68	12.836	32.05
29.2	21.666	84.20	6.56	90.62	28.524	52.10	12.755	31.37
July 9.1	21.500	82.72	6.04	88.49	28.464	52.45	12.690	30.68
19.1	21.375	80.89	5.62	85.97	28.423	52.68	12.641	29.99
29.1	21.294	78.74	5.31	83.11	28.404	52.82	12.612	29.34
Aug. 8.1	21.260	76.33	5.11	79.97	28.407	52.84	12.604	28.75
18.0	21.276	73.69	5.04	76.63	28.435	52.71	12.621	28.27
28.0	21.343	70.88	5.10	73.13	28.489	52.41	12.663	27.92
Sept. 7.0	21.463	67.93	5.30	69.56	28.574	51.93	12.736	27.76
17.0	21.637	64.90	5.61	65.98	28.689	51.23	12.840	27.80
26.9	21.866	61.86	6.05	62.48	28.837	50.33	12.976	28.10
Oct. 6.9	22.151	58.85	6.62	59.11	29.018	49.19	13.148	28.67
16.9	22.488	55.94	7.31	55.94	29.235	47.85	13.356	29.51
26.8	22.876	53.19	8.11	53.06	29.484	46.28	13.596	30.65
Nov. 5.8	23.310	50.68	9.00	50.55	29.762	44.53	13.868	32.07
15.8	23.782	48.46	9.97	48.46	30.067	42.63	14.167	33.76
25.8	24.284	46.59	10.99	46.87	30.389	40.63	14.484	35.66
Dec. 5.7	24.801	45.16	12.04	45.82	30.722	38.59	14.813	37.73
15.7	25.319	44.20	13.10	45.37	31.056	36.57	15.144	39.89
25.7	25.823	43.75	14.13	45.50	31.381	34.63	15.466	42.08
35.7	26.298	43.82	15.10	46.24	31.685	32.85	15.768	44.23
Mean Place	19.572	83.75	4.749	88.04	26.559	62.93	10.837	16.79
Sec δ, Tan δ	1.807	+1.505	4.173	+4.052	1.015	+0.171	1.000	-0.023
Dψ α, Dω α	+0.08	+0.09	+0.10	+0.25	+0.06	+0.01	+0.06	0.00
ψ δ, Dω δ	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	41 Leonis Minoris. Mag. 5.0		$\theta$ Argus. Mag. 3.0		42 Leonis Minoris. Mag. 5.4		77 Argus. Var. 1.6-6.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 38	° ' " +23 36	h m 10 39	° ' " -63 57	h m 10 41	° ' " +31 6	h m 10 41	° ' " -59 14
	s	"	s	"	s	"	s	"
Jan. 0.7	56.266	70.26	61.36	25.64	17.195	55.59	52.004	43.28
10.6	56.580 <sup>314</sup>	69.12 <sup>114</sup>	61.85 <sup>49</sup>	28.74 <sup>310</sup>	17.529 <sup>334</sup>	54.74 <sup>85</sup>	52.439 <sup>435</sup>	46.38 <sup>310</sup>
20.6	56.861 <sup>281</sup>	68.31 <sup>81</sup>	62.26 <sup>41</sup>	32.18 <sup>344</sup>	17.825 <sup>296</sup>	54.28 <sup>46</sup>	52.811 <sup>372</sup>	49.82 <sup>344</sup>
30.6	57.097 <sup>236</sup>	67.84 <sup>47</sup>	62.59 <sup>33</sup>	35.86 <sup>368</sup>	18.077 <sup>252</sup>	54.22 <sup>6</sup>	53.113 <sup>302</sup>	53.46 <sup>364</sup>
Feb. 9.6	57.286 <sup>189</sup>	67.73 <sup>11</sup>	62.83 <sup>24</sup>	39.69 <sup>383</sup>	18.278 <sup>201</sup>	54.53 <sup>31</sup>	53.336 <sup>223</sup>	57.23 <sup>377</sup>
	136	20	15	387	146	64	144	370
19.5	57.422	67.93	62.98	43.56	18.424	55.17	53.480	61.02
Mar. 1.5	57.506 <sup>84</sup>	68.41 <sup>48</sup>	63.04 <sup>6</sup>	47.40 <sup>384</sup>	18.513 <sup>89</sup>	56.09 <sup>92</sup>	53.548 <sup>68</sup>	64.76 <sup>374</sup>
11.5	57.541 <sup>35</sup>	69.12 <sup>71</sup>	63.02 <sup>2</sup>	51.10 <sup>370</sup>	18.549 <sup>36</sup>	57.24 <sup>115</sup>	53.541 <sup>7</sup>	68.34 <sup>358</sup>
21.4	57.530 <sup>11</sup>	69.99 <sup>87</sup>	62.91 <sup>11</sup>	54.58 <sup>348</sup>	18.537 <sup>12</sup>	58.52 <sup>128</sup>	53.467 <sup>74</sup>	71.71 <sup>337</sup>
31.4	57.482 <sup>48</sup>	70.98 <sup>99</sup>	62.74 <sup>17</sup>	57.79 <sup>321</sup>	18.482 <sup>55</sup>	59.87 <sup>135</sup>	53.331 <sup>136</sup>	74.79 <sup>308</sup>
	82	104	23	287	89	136	187	274
Apr. 10.4	57.400	72.02	62.51	60.66	18.393	61.23	53.144	77.53
20.4	57.295 <sup>105</sup>	73.06 <sup>104</sup>	62.23 <sup>28</sup>	63.13 <sup>247</sup>	18.277 <sup>116</sup>	62.52 <sup>129</sup>	52.914 <sup>230</sup>	79.89 <sup>236</sup>
30.3	57.173 <sup>122</sup>	74.03 <sup>97</sup>	61.91 <sup>32</sup>	65.16 <sup>203</sup>	18.143 <sup>134</sup>	63.69 <sup>117</sup>	52.651 <sup>263</sup>	81.81 <sup>192</sup>
May 10.3	57.043 <sup>130</sup>	74.91 <sup>88</sup>	61.56 <sup>35</sup>	66.73 <sup>157</sup>	17.999 <sup>144</sup>	64.69 <sup>100</sup>	52.363 <sup>288</sup>	83.25 <sup>144</sup>
20.3	56.911 <sup>132</sup>	75.66 <sup>75</sup>	61.18 <sup>38</sup>	67.79 <sup>106</sup>	17.851 <sup>148</sup>	65.51 <sup>82</sup>	52.058 <sup>305</sup>	84.22 <sup>97</sup>
	129	60	38	55	144	59	312	45
30.3	56.782	76.26	60.80	68.34	17.707	66.10	51.746	84.67
June 9.2	56.661 <sup>121</sup>	76.68 <sup>42</sup>	60.42 <sup>38</sup>	68.37 <sup>3</sup>	17.571 <sup>136</sup>	66.44 <sup>34</sup>	51.435 <sup>311</sup>	84.63 <sup>4</sup>
19.2	56.553 <sup>108</sup>	76.91 <sup>23</sup>	60.05 <sup>37</sup>	67.87 <sup>50</sup>	17.448 <sup>123</sup>	66.54 <sup>10</sup>	51.134 <sup>301</sup>	84.10 <sup>53</sup>
29.2	56.460 <sup>93</sup>	76.96 <sup>5</sup>	59.70 <sup>35</sup>	66.88 <sup>99</sup>	17.341 <sup>107</sup>	66.37 <sup>17</sup>	50.849 <sup>285</sup>	83.09 <sup>101</sup>
July 9.1	56.385 <sup>75</sup>	76.81 <sup>15</sup>	59.38 <sup>32</sup>	65.43 <sup>145</sup>	17.253 <sup>88</sup>	65.96 <sup>41</sup>	50.589 <sup>260</sup>	81.62 <sup>147</sup>
	55	34	28	188	65	67	226	187
19.1	56.330	76.47	59.10	63.55	17.188	65.29	50.363	79.75
29.1	56.298 <sup>32</sup>	75.94 <sup>53</sup>	58.87 <sup>23</sup>	61.30 <sup>225</sup>	17.146 <sup>42</sup>	64.39 <sup>90</sup>	50.178 <sup>185</sup>	77.53 <sup>222</sup>
Aug. 8.1	56.288 <sup>10</sup>	75.20 <sup>74</sup>	58.69 <sup>18</sup>	58.74 <sup>256</sup>	17.131 <sup>15</sup>	63.26 <sup>113</sup>	50.041 <sup>137</sup>	75.03 <sup>250</sup>
18.0	56.306 <sup>18</sup>	74.28 <sup>92</sup>	58.58 <sup>11</sup>	55.98 <sup>276</sup>	17.143 <sup>12</sup>	61.92 <sup>134</sup>	49.961 <sup>80</sup>	72.34 <sup>269</sup>
28.0	56.352 <sup>46</sup>	73.15 <sup>113</sup>	58.56 <sup>2</sup>	53.10 <sup>288</sup>	17.187 <sup>44</sup>	60.36 <sup>156</sup>	49.943 <sup>18</sup>	69.55 <sup>279</sup>
	77	132	5	289	75	174	51	279
Sept. 7.0	56.429	71.83	58.61	50.21	17.262	58.62	49.994	66.76
17.0	56.539 <sup>110</sup>	70.33 <sup>150</sup>	58.75 <sup>14</sup>	47.42 <sup>279</sup>	17.374 <sup>112</sup>	56.70 <sup>192</sup>	50.117 <sup>123</sup>	64.08 <sup>268</sup>
26.9	56.682 <sup>143</sup>	68.65 <sup>168</sup>	58.97 <sup>22</sup>	44.84 <sup>258</sup>	17.523 <sup>149</sup>	54.62 <sup>208</sup>	50.314 <sup>197</sup>	61.62 <sup>246</sup>
Oct. 6.9	56.863 <sup>181</sup>	66.81 <sup>184</sup>	59.28 <sup>31</sup>	42.59 <sup>225</sup>	17.709 <sup>186</sup>	52.43 <sup>219</sup>	50.587 <sup>273</sup>	59.49 <sup>213</sup>
16.9	57.081 <sup>218</sup>	64.82 <sup>199</sup>	59.67 <sup>39</sup>	40.76 <sup>183</sup>	17.934 <sup>225</sup>	50.14 <sup>229</sup>	50.928 <sup>341</sup>	57.77 <sup>172</sup>
	253	209	46	134	264	234	406	122
26.8	57.334	62.73	60.13	39.42	18.198	47.80	51.334	56.55
Nov. 5.8	57.619 <sup>285</sup>	60.58 <sup>215</sup>	60.66 <sup>53</sup>	38.66 <sup>76</sup>	18.497 <sup>299</sup>	45.46 <sup>234</sup>	51.794 <sup>460</sup>	55.91 <sup>64</sup>
15.8	57.934 <sup>315</sup>	58.42 <sup>216</sup>	61.23 <sup>57</sup>	38.52 <sup>14</sup>	18.825 <sup>328</sup>	43.18 <sup>228</sup>	52.296 <sup>502</sup>	55.89 <sup>2</sup>
25.8	58.270 <sup>336</sup>	56.30 <sup>212</sup>	61.84 <sup>61</sup>	39.04 <sup>52</sup>	19.178 <sup>353</sup>	41.03 <sup>215</sup>	52.825 <sup>529</sup>	56.49 <sup>60</sup>
Dec. 5.7	58.622 <sup>352</sup>	54.28 <sup>202</sup>	62.45 <sup>61</sup>	40.19 <sup>115</sup>	19.546 <sup>368</sup>	39.05 <sup>198</sup>	53.364 <sup>539</sup>	57.72 <sup>123</sup>
	353	184	59	176	372	172	532	183
15.7	58.975	52.44	63.04	41.95	19.918	37.33	53.896	59.55
25.7	59.321 <sup>346</sup>	50.84 <sup>160</sup>	63.61 <sup>57</sup>	44.28 <sup>233</sup>	20.284 <sup>366</sup>	35.91 <sup>142</sup>	54.403 <sup>507</sup>	61.93 <sup>238</sup>
35.7	59.650 <sup>329</sup>	49.51 <sup>133</sup>	64.13 <sup>52</sup>	47.09 <sup>281</sup>	20.630 <sup>346</sup>	34.85 <sup>106</sup>	54.869 <sup>466</sup>	64.76 <sup>283</sup>
Mean Place	54.375	83.92	59.488	35.70	15.213	71.33	50.234	52.58
Sec $\delta$ , Tan $\delta$	1.091	+0.437	2.278	-2.047	1.168	+0.604	1.956	-1.881
$D\alpha$ , $D\omega$	+0.07	+0.03	+0.04	-0.13	+0.07	+0.04	+0.05	-0.11
$D\delta$ , $D\omega$	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Argus. Mag. 2.8			$\zeta$ Leonis. Mag. 5.3			$\delta^3$ Chamaeleon. Mag. 4.6			$\gamma$ Hydrea. Mag. 3.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 10 43	s 10 43	° ' " —48 58	h m 10 44	s 10 44	° ' " +10 58	h m 10 44	s 10 44	° ' " —80 5	h m 10 45	s 10 45	° ' " —15 45
Jan. 0.7	13.403	368	46.71	55.517	54.44	54.44	64.00	56.53	33.280	33.57	33.57	33.57
10.6	13.771	309	49.80	55.818	52.76	52.76	65.05	59.37	33.577	36.12	36.12	36.12
20.6	14.089	318	53.14	56.086	51.31	51.31	65.96	62.65	33.840	38.68	38.68	38.68
30.6	14.350	261	56.66	56.314	50.15	50.15	66.66	66.26	34.061	41.12	41.12	41.12
Feb. 9.6	14.550	200	60.23	56.497	49.27	49.27	67.16	70.06	34.237	43.44	43.44	43.44
19.5	14.684	73	63.79	56.632	48.69	48.69	67.44	74.01	34.366	45.58	45.58	45.58
Mar. 1.5	14.757	13	67.23	56.718	48.39	48.39	67.52	77.99	34.447	47.51	47.51	47.51
11.5	14.770	42	70.50	56.758	48.33	48.33	67.38	81.92	34.484	49.17	49.17	49.17
21.5	14.728	90	73.53	56.758	48.50	48.50	67.05	85.69	34.480	50.58	50.58	50.58
31.4	14.638	128	76.27	56.721	48.84	48.84	66.55	89.24	34.442	51.72	51.72	51.72
Apr. 10.4	14.510	162	78.66	56.654	49.31	49.31	65.88	92.50	34.374	52.60	52.60	52.60
20.4	14.348	187	80.67	56.566	49.87	49.87	65.08	95.39	34.286	53.21	53.21	53.21
30.3	14.161	204	82.28	56.463	50.48	50.48	64.17	97.86	34.182	53.57	53.57	53.57
May 10.3	13.957	217	83.44	56.351	51.12	51.12	63.16	99.89	34.069	53.68	53.68	53.68
20.3	13.740	219	84.16	56.236	51.75	51.75	62.08	101.39	33.951	53.55	53.55	53.55
30.3	13.521	218	84.41	56.124	52.36	52.36	60.95	102.38	33.835	53.20	53.20	53.20
June 9.2	13.303	209	84.21	56.017	52.91	52.91	59.82	102.80	33.721	52.64	52.64	52.64
19.2	13.094	197	83.56	55.919	53.39	53.39	58.70	102.68	33.617	51.89	51.89	51.89
29.2	12.897	177	82.48	55.835	53.80	53.80	57.62	102.02	33.523	50.98	50.98	50.98
July 9.2	12.720	152	81.02	55.766	54.11	54.11	56.61	100.83	33.442	49.92	49.92	49.92
19.1	12.568	122	79.20	55.713	54.31	54.31	55.71	99.13	33.379	48.74	48.74	48.74
29.1	12.446	85	77.09	55.680	54.99	54.99	54.94	97.02	33.335	47.52	47.52	47.52
Aug. 8.1	12.361	44	74.76	55.668	54.34	54.34	54.34	94.54	33.313	46.27	46.27	46.27
18.0	12.317	4	72.29	55.681	54.12	54.12	53.91	91.75	33.314	45.04	45.04	45.04
28.0	12.321	54	69.75	55.719	53.74	53.74	53.70	88.79	33.345	43.90	43.90	43.90
Sept. 7.0	12.375	109	67.25	55.787	53.18	53.18	53.69	85.72	33.407	42.90	42.90	42.90
17.0	12.484	166	64.89	55.886	52.39	52.39	53.92	82.71	33.502	42.10	42.10	42.10
26.9	12.650	228	62.77	56.017	51.40	51.40	54.37	79.83	33.633	41.55	41.55	41.55
Oct. 6.9	12.873	280	60.98	56.184	50.17	50.17	55.05	77.22	33.802	41.33	41.33	41.33
16.9	13.153	330	59.62	56.387	48.74	48.74	55.93	74.96	34.009	41.45	41.45	41.45
26.9	13.483	374	58.75	56.624	47.09	47.09	56.98	73.17	34.253	41.93	41.93	41.93
Nov. 5.8	13.857	410	58.43	56.895	45.26	45.26	58.20	71.95	34.529	42.81	42.81	42.81
15.8	14.267	435	58.69	57.194	43.30	43.30	59.52	71.34	34.834	44.08	44.08	44.08
25.8	14.702	444	59.55	57.513	41.25	41.25	60.90	71.39	35.158	45.70	45.70	45.70
Dec. 5.7	15.146	440	60.99	57.846	39.16	39.16	62.29	72.09	35.495	47.64	47.64	47.64
15.7	15.586	423	62.98	58.183	37.11	37.11	63.66	73.46	35.835	49.84	49.84	49.84
25.7	16.009	391	65.44	58.514	35.15	35.15	64.95	75.42	36.166	52.22	52.22	52.22
35.7	16.400	391	68.29	58.828	33.35	33.35	66.11	77.96	36.476	54.71	54.71	54.71
Mean Place	11.758		53.94	53.786	64.66	64.66	61.016	68.64	31.690	31.67	31.67	31.67
Sec $\delta$ , Tan $\delta$	1.524		—1.150	1.019	+0.194	+0.194	5.819	—5.733	1.039	—0.282	—0.282	—0.282
$D\mu\alpha, D\mu\alpha$	+0.05		—0.07	+0.06	+0.01	+0.01	+0.01	—0.36	+0.06	—0.02	—0.02	—0.02
$D\delta, D\delta$	—0.4		+0.3	—0.4	+0.3	+0.3	—0.4	+0.3	—0.4	+0.3	+0.3	+0.3

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	46 Leonis Minoris. Mag. 3.9		54 Leonis. Mag. 4.5		Antilae. Mag. 4.7		Groombridge 1706. Mag. 6.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 48 s	° ' " +34 39 "	h m 10 51 s	° ' " +25 10 "	h m 10 52 s	° ' " -36 41 "	h m 10 53 s	° ' " +78 12 "
Jan. 0.7	42.459	28.78	9.150	79.35	52.647	24.65	26.65	30.81
10.6	42.807 <sup>348</sup>	28.02 <sup>76</sup>	9.475 <sup>325</sup>	78.20 <sup>115</sup>	52.981 <sup>334</sup>	27.56 <sup>291</sup>	27.74 <sup>100</sup>	31.63 <sup>82</sup>
20.6	43.118 <sup>311</sup>	27.67 <sup>35</sup>	9.766 <sup>291</sup>	77.40 <sup>80</sup>	53.274 <sup>293</sup>	30.67 <sup>311</sup>	28.72 <sup>98</sup>	33.04 <sup>141</sup>
30.6	43.384 <sup>266</sup>	27.75 <sup>8</sup>	10.016 <sup>250</sup>	76.96 <sup>44</sup>	53.520 <sup>246</sup>	33.86 <sup>319</sup>	29.55 <sup>83</sup>	34.96 <sup>192</sup>
Feb. 9.6	43.598 <sup>214</sup>	28.21 <sup>46</sup>	10.218 <sup>202</sup>	76.89 <sup>7</sup>	53.716 <sup>196</sup>	37.06 <sup>320</sup>	30.20 <sup>65</sup>	37.30 <sup>234</sup>
19.5	43.757 <sup>159</sup>	29.02 <sup>81</sup>	10.368 <sup>150</sup>	77.16 <sup>27</sup>	53.857 <sup>141</sup>	40.18 <sup>312</sup>	30.66 <sup>46</sup>	39.99 <sup>200</sup>
Mar. 1.5	43.858 <sup>101</sup>	30.13 <sup>111</sup>	10.466 <sup>98</sup>	77.71 <sup>55</sup>	53.945 <sup>88</sup>	43.16 <sup>298</sup>	30.90 <sup>24</sup>	42.90 <sup>201</sup>
11.5	43.902 <sup>44</sup>	31.45 <sup>132</sup>	10.514 <sup>48</sup>	78.52 <sup>81</sup>	53.982 <sup>37</sup>	45.95 <sup>279</sup>	30.92 <sup>2</sup>	45.89 <sup>200</sup>
21.5	43.896 <sup>6</sup>	32.92 <sup>147</sup>	10.516 <sup>2</sup>	79.49 <sup>97</sup>	53.973 <sup>9</sup>	48.48 <sup>253</sup>	30.75 <sup>17</sup>	48.84 <sup>206</sup>
31.4	43.846 <sup>50</sup>	34.46 <sup>154</sup>	10.476 <sup>40</sup>	80.59 <sup>110</sup>	53.923 <sup>50</sup>	50.72 <sup>224</sup>	30.37 <sup>38</sup>	51.65 <sup>281</sup>
Apr. 10.4	43.757 <sup>89</sup>	35.98 <sup>152</sup>	10.403 <sup>73</sup>	81.74 <sup>115</sup>	53.839 <sup>84</sup>	52.66 <sup>194</sup>	29.83 <sup>54</sup>	54.19 <sup>254</sup>
20.4	43.640 <sup>117</sup>	37.42 <sup>144</sup>	10.306 <sup>97</sup>	82.88 <sup>114</sup>	53.730 <sup>109</sup>	54.24 <sup>158</sup>	29.16 <sup>67</sup>	56.37 <sup>218</sup>
30.3	43.502 <sup>138</sup>	38.73 <sup>131</sup>	10.188 <sup>118</sup>	83.97 <sup>109</sup>	53.599 <sup>131</sup>	55.46 <sup>122</sup>	28.36 <sup>80</sup>	58.10 <sup>173</sup>
May 10.3	43.351 <sup>151</sup>	39.83 <sup>101</sup>	10.060 <sup>128</sup>	84.95 <sup>98</sup>	53.453 <sup>146</sup>	56.30 <sup>84</sup>	27.49 <sup>87</sup>	59.35 <sup>125</sup>
20.3	43.195 <sup>156</sup>	40.71 <sup>88</sup>	9.929 <sup>131</sup>	85.78 <sup>83</sup>	53.298 <sup>155</sup>	56.77 <sup>47</sup>	26.57 <sup>92</sup>	60.08 <sup>73</sup>
30.3	43.041 <sup>147</sup>	41.33 <sup>34</sup>	9.798 <sup>125</sup>	86.44 <sup>48</sup>	53.140 <sup>157</sup>	56.85 <sup>29</sup>	25.64 <sup>91</sup>	60.24 <sup>39</sup>
June 9.2	42.894 <sup>135</sup>	41.67 <sup>6</sup>	9.673 <sup>114</sup>	86.92 <sup>26</sup>	52.983 <sup>150</sup>	56.56 <sup>66</sup>	24.73 <sup>87</sup>	59.85 <sup>96</sup>
19.2	42.759 <sup>118</sup>	41.73 <sup>24</sup>	9.559 <sup>102</sup>	87.18 <sup>6</sup>	52.833 <sup>141</sup>	55.90 <sup>100</sup>	23.86 <sup>80</sup>	58.90 <sup>146</sup>
29.2	42.641 <sup>101</sup>	41.49 <sup>51</sup>	9.457 <sup>85</sup>	87.24 <sup>15</sup>	52.692 <sup>126</sup>	54.90 <sup>132</sup>	23.06 <sup>72</sup>	57.44 <sup>195</sup>
July 9.2	42.540 <sup>77</sup>	40.98 <sup>79</sup>	9.372 <sup>65</sup>	87.09 <sup>38</sup>	52.566 <sup>107</sup>	53.58 <sup>159</sup>	22.34 <sup>61</sup>	55.49 <sup>236</sup>
19.1	42.463 <sup>53</sup>	40.19 <sup>105</sup>	9.307 <sup>45</sup>	86.71 <sup>58</sup>	52.459 <sup>87</sup>	51.99 <sup>181</sup>	21.73 <sup>49</sup>	53.13 <sup>275</sup>
29.1	42.410 <sup>26</sup>	39.14 <sup>130</sup>	9.262 <sup>21</sup>	86.13 <sup>81</sup>	52.372 <sup>58</sup>	50.18 <sup>198</sup>	21.24 <sup>35</sup>	50.38 <sup>308</sup>
Aug. 8.1	42.384 <sup>2</sup>	37.84 <sup>154</sup>	9.241 <sup>4</sup>	85.32 <sup>100</sup>	52.314 <sup>28</sup>	48.20 <sup>207</sup>	20.89 <sup>23</sup>	47.30 <sup>332</sup>
18.0	42.386 <sup>35</sup>	36.30 <sup>175</sup>	9.245 <sup>33</sup>	84.32 <sup>122</sup>	52.286 <sup>8</sup>	46.13 <sup>208</sup>	20.66 <sup>8</sup>	43.98 <sup>352</sup>
28.0	42.421 <sup>68</sup>	34.55 <sup>195</sup>	9.278 <sup>64</sup>	83.10 <sup>142</sup>	52.294 <sup>47</sup>	44.05 <sup>203</sup>	20.58 <sup>8</sup>	40.46 <sup>364</sup>
Sept. 7.0	42.489 <sup>105</sup>	32.60 <sup>213</sup>	9.342 <sup>96</sup>	81.68 <sup>161</sup>	52.341 <sup>92</sup>	42.02 <sup>186</sup>	20.66 <sup>22</sup>	36.82 <sup>370</sup>
17.0	42.594 <sup>143</sup>	30.47 <sup>228</sup>	9.438 <sup>132</sup>	80.07 <sup>179</sup>	52.433 <sup>136</sup>	40.16 <sup>163</sup>	20.88 <sup>38</sup>	33.12 <sup>366</sup>
26.9	42.737 <sup>183</sup>	28.19 <sup>238</sup>	9.570 <sup>170</sup>	78.28 <sup>195</sup>	52.569 <sup>184</sup>	38.53 <sup>130</sup>	21.26 <sup>54</sup>	29.46 <sup>355</sup>
Oct. 6.9	42.920 <sup>225</sup>	25.81 <sup>245</sup>	9.740 <sup>207</sup>	76.33 <sup>210</sup>	52.753 <sup>230</sup>	37.23 <sup>91</sup>	21.80 <sup>67</sup>	25.91 <sup>339</sup>
16.9	43.145 <sup>264</sup>	23.36 <sup>249</sup>	9.947 <sup>245</sup>	74.23 <sup>219</sup>	52.983 <sup>274</sup>	36.32 <sup>45</sup>	22.47 <sup>81</sup>	22.52 <sup>313</sup>
26.9	43.409 <sup>301</sup>	20.87 <sup>247</sup>	10.192 <sup>279</sup>	72.04 <sup>225</sup>	53.257 <sup>315</sup>	35.87 <sup>4</sup>	23.28 <sup>94</sup>	19.39 <sup>280</sup>
Nov. 5.8	43.710 <sup>333</sup>	18.40 <sup>238</sup>	10.471 <sup>311</sup>	69.79 <sup>226</sup>	53.572 <sup>346</sup>	35.91 <sup>56</sup>	24.22 <sup>106</sup>	16.59 <sup>238</sup>
15.8	44.043 <sup>361</sup>	16.02 <sup>222</sup>	10.782 <sup>335</sup>	67.53 <sup>220</sup>	53.918 <sup>372</sup>	36.47 <sup>109</sup>	25.28 <sup>113</sup>	14.21 <sup>191</sup>
25.8	44.404 <sup>376</sup>	13.80 <sup>200</sup>	11.117 <sup>352</sup>	65.33 <sup>207</sup>	54.290 <sup>383</sup>	37.56 <sup>158</sup>	26.41 <sup>118</sup>	12.30 <sup>135</sup>
Dec. 5.7	44.780 <sup>383</sup>	11.80 <sup>172</sup>	11.469 <sup>357</sup>	63.26 <sup>190</sup>	54.673 <sup>385</sup>	39.14 <sup>204</sup>	27.59 <sup>121</sup>	10.95 <sup>77</sup>
15.7	45.163 <sup>378</sup>	10.08 <sup>139</sup>	11.826 <sup>352</sup>	61.36 <sup>164</sup>	55.058 <sup>373</sup>	41.18 <sup>243</sup>	28.80 <sup>120</sup>	10.18 <sup>16</sup>
25.7	45.541 <sup>362</sup>	8.69 <sup>100</sup>	12.178 <sup>336</sup>	59.72 <sup>135</sup>	55.431 <sup>351</sup>	43.61 <sup>276</sup>	30.00 <sup>115</sup>	10.02 <sup>46</sup>
35.7	45.903	7.69	12.514	58.37	55.782	46.37	31.15	10.48
Mean Place	40.473	45.71	7.318	93.92	51.107	28.88	21.248	54.54
Sec $\delta$ , Tan $\delta$	1.216	+0.691	1.105	+0.470	1.247	-0.745	4.894	+4.790
$D\phi\alpha$ , $D\omega\alpha$	+0.07	+0.04	+0.07	+0.03	+0.06	-0.05	+0.10	+0.31
$D\phi\delta$ , $D\omega\delta$	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Crateris. Mag. 4.2		$\delta$ Leonis. Mag. 5.0		$\beta$ Ursæ Majoris. Mag. 2.4		$\alpha$ Ursæ Majoris. Mag. 2.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 10 55	" ' s -17 51	h m 10 56	" ' s + 4 3	h m 10 56	" ' s +56 48	h m 10 58	" ' s +62 11
Jan. 0.7	45.271	25.59	18.100	39.73	53.125	77.52	39.93	35.00
10.7	45.575 <sup>304</sup>	28.17 <sup>258</sup>	18.402 <sup>302</sup>	37.77 <sup>196</sup>	53.604 <sup>479</sup>	77.57 <sup>5</sup>	40.48 <sup>55</sup>	35.23 <sup>23</sup>
20.6	45.846 <sup>271</sup>	30.76 <sup>259</sup>	18.673 <sup>271</sup>	35.99 <sup>178</sup>	54.036 <sup>432</sup>	78.16 <sup>59</sup>	40.97 <sup>49</sup>	36.01 <sup>78</sup>
30.6	46.078 <sup>232</sup>	33.29 <sup>253</sup>	18.907 <sup>234</sup>	34.44 <sup>155</sup>	54.407 <sup>371</sup>	79.25 <sup>109</sup>	41.39 <sup>42</sup>	37.32 <sup>131</sup>
Feb. 9.6	46.264 <sup>186</sup>	35.72 <sup>243</sup>	19.096 <sup>189</sup>	33.15 <sup>129</sup>	54.707 <sup>300</sup>	80.80 <sup>155</sup>	41.72 <sup>33</sup>	39.08 <sup>176</sup>
19.5	46.401 <sup>137</sup>	37.98 <sup>226</sup>	19.239 <sup>143</sup>	32.13 <sup>102</sup>	54.926 <sup>219</sup>	82.72 <sup>192</sup>	41.97 <sup>25</sup>	41.22 <sup>214</sup>
Mar. 1.5	46.492 <sup>91</sup>	40.02 <sup>204</sup>	19.335 <sup>96</sup>	31.38 <sup>75</sup>	55.062 <sup>136</sup>	84.93 <sup>221</sup>	42.13 <sup>16</sup>	43.62 <sup>240</sup>
11.5	46.539 <sup>47</sup>	41.82 <sup>180</sup>	19.387 <sup>52</sup>	30.89 <sup>49</sup>	55.115 <sup>53</sup>	87.31 <sup>238</sup>	42.19 <sup>6</sup>	46.20 <sup>258</sup>
21.5	46.544 <sup>5</sup>	43.36 <sup>154</sup>	19.398 <sup>11</sup>	30.65 <sup>24</sup>	55.092 <sup>23</sup>	89.76 <sup>245</sup>	42.14 <sup>5</sup>	48.83 <sup>263</sup>
31.4	46.513 <sup>31</sup>	44.65 <sup>129</sup>	19.372 <sup>26</sup>	30.60 <sup>5</sup>	54.997 <sup>95</sup>	92.17 <sup>241</sup>	42.02 <sup>12</sup>	51.38 <sup>255</sup>
Apr. 10.4	46.453 <sup>60</sup>	45.65 <sup>100</sup>	19.318 <sup>54</sup>	30.74 <sup>14</sup>	54.841 <sup>156</sup>	94.44 <sup>227</sup>	41.83 <sup>19</sup>	53.78 <sup>240</sup>
20.4	46.371 <sup>82</sup>	46.38 <sup>73</sup>	19.241 <sup>77</sup>	31.03 <sup>29</sup>	54.636 <sup>205</sup>	96.48 <sup>204</sup>	41.58 <sup>25</sup>	55.91 <sup>213</sup>
30.4	46.271 <sup>100</sup>	46.86 <sup>48</sup>	19.148 <sup>93</sup>	31.42 <sup>39</sup>	54.395 <sup>241</sup>	98.22 <sup>174</sup>	41.28 <sup>30</sup>	57.70 <sup>179</sup>
May 10.3	46.161 <sup>110</sup>	47.07 <sup>21</sup>	19.045 <sup>103</sup>	31.90 <sup>48</sup>	54.127 <sup>268</sup>	99.61 <sup>139</sup>	40.96 <sup>32</sup>	59.11 <sup>141</sup>
20.3	46.043 <sup>118</sup>	47.04 <sup>3</sup>	18.937 <sup>108</sup>	32.44 <sup>54</sup>	53.847 <sup>280</sup>	100.57 <sup>96</sup>	40.61 <sup>35</sup>	60.07 <sup>96</sup>
30.3	45.925 <sup>118</sup>	46.76 <sup>28</sup>	18.829 <sup>108</sup>	33.01 <sup>57</sup>	53.564 <sup>283</sup>	101.10 <sup>53</sup>	40.26 <sup>35</sup>	60.55 <sup>48</sup>
June 9.2	45.811 <sup>114</sup>	46.27 <sup>49</sup>	18.725 <sup>104</sup>	33.60 <sup>59</sup>	53.289 <sup>275</sup>	101.19 <sup>9</sup>	39.92 <sup>34</sup>	60.55 <sup>0</sup>
19.2	45.701 <sup>110</sup>	45.56 <sup>71</sup>	18.628 <sup>97</sup>	34.18 <sup>58</sup>	53.031 <sup>258</sup>	100.82 <sup>37</sup>	39.60 <sup>32</sup>	60.07 <sup>48</sup>
29.2	45.600 <sup>101</sup>	44.67 <sup>89</sup>	18.541 <sup>87</sup>	34.75 <sup>57</sup>	52.794 <sup>237</sup>	100.01 <sup>81</sup>	39.30 <sup>30</sup>	59.12 <sup>95</sup>
July 9.2	45.512 <sup>88</sup>	43.62 <sup>105</sup>	18.468 <sup>73</sup>	35.28 <sup>53</sup>	52.588 <sup>206</sup>	98.78 <sup>123</sup>	39.03 <sup>27</sup>	57.73 <sup>139</sup>
19.1	45.440 <sup>72</sup>	42.43 <sup>119</sup>	18.409 <sup>59</sup>	35.76 <sup>48</sup>	52.417 <sup>171</sup>	97.15 <sup>163</sup>	38.81 <sup>22</sup>	55.92 <sup>181</sup>
29.1	45.385 <sup>55</sup>	41.16 <sup>127</sup>	18.368 <sup>41</sup>	36.16 <sup>40</sup>	52.284 <sup>133</sup>	95.17 <sup>198</sup>	38.64 <sup>17</sup>	53.74 <sup>218</sup>
Aug. 8.1	45.352 <sup>33</sup>	39.86 <sup>130</sup>	18.347 <sup>21</sup>	36.46 <sup>30</sup>	52.195 <sup>89</sup>	92.88 <sup>229</sup>	38.52 <sup>12</sup>	51.23 <sup>251</sup>
18.1	45.342 <sup>10</sup>	38.56 <sup>130</sup>	18.347 <sup>0</sup>	36.62 <sup>16</sup>	52.152 <sup>43</sup>	90.30 <sup>258</sup>	38.45 <sup>7</sup>	48.44 <sup>279</sup>
28.0	45.361 <sup>19</sup>	37.33 <sup>123</sup>	18.374 <sup>27</sup>	36.64 <sup>2</sup>	52.158 <sup>6</sup>	87.49 <sup>281</sup>	38.44 <sup>1</sup>	45.42 <sup>302</sup>
Sept. 7.0	45.410 <sup>49</sup>	36.23 <sup>110</sup>	18.428 <sup>54</sup>	36.47 <sup>17</sup>	52.217 <sup>59</sup>	84.49 <sup>300</sup>	38.49 <sup>5</sup>	42.23 <sup>319</sup>
17.0	45.495 <sup>85</sup>	35.31 <sup>92</sup>	18.514 <sup>86</sup>	36.10 <sup>37</sup>	52.331 <sup>114</sup>	81.37 <sup>312</sup>	38.61 <sup>12</sup>	38.92 <sup>331</sup>
26.9	45.615 <sup>120</sup>	34.65 <sup>66</sup>	18.634 <sup>120</sup>	35.48 <sup>62</sup>	52.502 <sup>171</sup>	78.18 <sup>319</sup>	38.80 <sup>19</sup>	35.55 <sup>337</sup>
Oct. 6.9	45.775 <sup>160</sup>	34.29 <sup>36</sup>	18.789 <sup>155</sup>	34.63 <sup>85</sup>	52.733 <sup>231</sup>	74.98 <sup>320</sup>	39.05 <sup>25</sup>	32.20 <sup>335</sup>
16.9	45.975 <sup>200</sup>	34.26 <sup>3</sup>	18.980 <sup>191</sup>	33.52 <sup>111</sup>	53.021 <sup>288</sup>	71.82 <sup>316</sup>	39.38 <sup>33</sup>	28.93 <sup>327</sup>
26.9	46.211 <sup>236</sup>	34.63 <sup>37</sup>	19.207 <sup>227</sup>	32.16 <sup>136</sup>	53.366 <sup>345</sup>	68.80 <sup>302</sup>	39.77 <sup>39</sup>	25.82 <sup>311</sup>
Nov. 5.8	46.483 <sup>272</sup>	35.39 <sup>76</sup>	19.468 <sup>261</sup>	30.55 <sup>161</sup>	53.764 <sup>398</sup>	65.96 <sup>284</sup>	40.22 <sup>45</sup>	22.92 <sup>290</sup>
15.8	46.785 <sup>302</sup>	36.55 <sup>116</sup>	19.758 <sup>290</sup>	28.74 <sup>181</sup>	54.210 <sup>446</sup>	63.39 <sup>257</sup>	40.72 <sup>50</sup>	20.35 <sup>257</sup>
25.8	47.110 <sup>325</sup>	38.09 <sup>154</sup>	20.072 <sup>314</sup>	26.77 <sup>197</sup>	54.694 <sup>484</sup>	61.17 <sup>222</sup>	41.27 <sup>55</sup>	18.16 <sup>219</sup>
Dec. 5.8	47.448 <sup>338</sup>	39.95 <sup>186</sup>	20.400 <sup>328</sup>	24.67 <sup>214</sup>	55.202 <sup>508</sup>	59.37 <sup>180</sup>	41.84 <sup>57</sup>	16.41 <sup>175</sup>
15.7	47.790 <sup>342</sup>	42.11 <sup>216</sup>	20.733 <sup>333</sup>	22.53 <sup>214</sup>	55.724 <sup>522</sup>	58.03 <sup>134</sup>	42.43 <sup>59</sup>	15.17 <sup>124</sup>
25.7	48.126 <sup>336</sup>	44.47 <sup>236</sup>	21.062 <sup>329</sup>	20.43 <sup>210</sup>	56.241 <sup>517</sup>	57.21 <sup>82</sup>	43.02 <sup>59</sup>	14.48 <sup>69</sup>
35.7	48.444 <sup>318</sup>	46.99 <sup>252</sup>	21.376 <sup>314</sup>	18.40 <sup>203</sup>	56.737 <sup>496</sup>	56.93 <sup>28</sup>	43.58 <sup>56</sup>	14.36 <sup>12</sup>
Mean Place	43.737	24.26	16.480	48.08	50.595	99.35	37.132	57.70
Sec $\delta$ , Tan $\delta$	1.051	-0.322	1.003	+0.071	1.827	+1.529	2.144	+1.896
$D\phi\alpha, D\omega\alpha$	+0.06	-0.02	+0.06	0.00	+0.07	+0.10	+0.07	+0.12
$D\phi\delta, D\omega\delta$	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3	-0.4	+0.3



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\chi$ Leonis. Mag. 4.7		$p^4$ Leonis. Mag. 5.7		$\psi$ Ursae Majoris. Mag. 3.2		$\beta$ Crateris. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 0	° ' " + 7 46	h m 11 2	° ' " + 2 23	h m 11 5	° ' " +44 56	h m 11 7	° ' " -22 22
	s	"	s	"	s	"	s	"
Jan. 0.7	45.824	56.73	41.822	75.32	2.294	36.78	35.890	21.38
10.7	46.130 <sup>306</sup>	54.88 <sup>185</sup>	42.125 <sup>303</sup>	73.29 <sup>208</sup>	2.690 <sup>396</sup>	36.29 <sup>49</sup>	36.206 <sup>316</sup>	24.02 <sup>264</sup>
20.6	46.406 <sup>276</sup>	53.26 <sup>162</sup>	42.399 <sup>274</sup>	71.43 <sup>186</sup>	3.051 <sup>361</sup>	36.30 <sup>1</sup>	36.491 <sup>285</sup>	26.72 <sup>270</sup>
30.6	46.644 <sup>238</sup>	51.88 <sup>138</sup>	42.636 <sup>237</sup>	69.79 <sup>164</sup>	3.364 <sup>313</sup>	36.78 <sup>48</sup>	36.736 <sup>245</sup>	29.41 <sup>269</sup>
Feb. 9.6	46.838 <sup>194</sup>	50.79 <sup>109</sup>	42.830 <sup>194</sup>	68.39 <sup>140</sup>	3.621 <sup>257</sup>	37.71 <sup>93</sup>	36.936 <sup>200</sup>	32.02 <sup>261</sup>
	147	80	148	112	193	122	153	248
19.5	46.985 <sup>101</sup>	49.99 <sup>52</sup>	42.978 <sup>101</sup>	67.27 <sup>87</sup>	3.814 <sup>130</sup>	39.03 <sup>164</sup>	37.069 <sup>105</sup>	34.50 <sup>230</sup>
Mar. 1.5	47.086 <sup>56</sup>	49.47 <sup>26</sup>	43.079 <sup>57</sup>	66.40 <sup>59</sup>	3.944 <sup>65</sup>	40.67 <sup>186</sup>	37.194 <sup>59</sup>	36.80 <sup>206</sup>
11.5	47.142 <sup>14</sup>	49.21 <sup>3</sup>	43.136 <sup>16</sup>	65.81 <sup>35</sup>	4.009 <sup>5</sup>	42.53 <sup>190</sup>	37.253 <sup>18</sup>	38.86 <sup>182</sup>
21.5	47.156 <sup>22</sup>	49.18 <sup>19</sup>	43.152 <sup>13</sup>	65.46 <sup>13</sup>	4.014 <sup>50</sup>	44.52 <sup>203</sup>	37.271 <sup>20</sup>	40.68 <sup>155</sup>
31.4	47.134 <sup>53</sup>	49.37 <sup>33</sup>	43.133 <sup>49</sup>	65.33 <sup>5</sup>	3.964 <sup>96</sup>	46.55 <sup>199</sup>	37.251 <sup>49</sup>	42.23 <sup>127</sup>
Apr. 10.4	47.081 <sup>75</sup>	49.70 <sup>45</sup>	43.084 <sup>72</sup>	65.38 <sup>22</sup>	3.868 <sup>134</sup>	48.54 <sup>186</sup>	37.202 <sup>76</sup>	43.50 <sup>99</sup>
20.4	47.006 <sup>91</sup>	50.15 <sup>54</sup>	43.012 <sup>89</sup>	65.60 <sup>33</sup>	3.734 <sup>163</sup>	50.40 <sup>164</sup>	37.126 <sup>93</sup>	44.49 <sup>71</sup>
30.4	46.915 <sup>103</sup>	50.69 <sup>59</sup>	42.923 <sup>100</sup>	65.93 <sup>44</sup>	3.571 <sup>181</sup>	52.04 <sup>138</sup>	37.033 <sup>107</sup>	45.20 <sup>43</sup>
May 10.3	46.812 <sup>109</sup>	51.28 <sup>62</sup>	42.823 <sup>106</sup>	66.37 <sup>51</sup>	3.390 <sup>192</sup>	53.42 <sup>71</sup>	36.926 <sup>117</sup>	45.63 <sup>14</sup>
20.3	46.703 <sup>109</sup>	51.90 <sup>61</sup>	42.717 <sup>107</sup>	66.88 <sup>55</sup>	3.198 <sup>195</sup>	54.48 <sup>106</sup>	36.809 <sup>120</sup>	45.77 <sup>13</sup>
30.3	46.594 <sup>106</sup>	52.51 <sup>59</sup>	42.610 <sup>104</sup>	67.43 <sup>59</sup>	3.003 <sup>190</sup>	55.19 <sup>36</sup>	36.689 <sup>118</sup>	45.64 <sup>39</sup>
June 9.2	46.488 <sup>99</sup>	53.10 <sup>56</sup>	42.506 <sup>99</sup>	68.02 <sup>60</sup>	2.813 <sup>180</sup>	55.55 <sup>1</sup>	36.571 <sup>116</sup>	45.25 <sup>63</sup>
19.2	46.389 <sup>89</sup>	53.66 <sup>50</sup>	42.407 <sup>89</sup>	68.62 <sup>60</sup>	2.633 <sup>165</sup>	55.54 <sup>40</sup>	36.455 <sup>109</sup>	44.62 <sup>87</sup>
29.2	46.300 <sup>77</sup>	54.16 <sup>42</sup>	42.318 <sup>77</sup>	69.22 <sup>58</sup>	2.468 <sup>143</sup>	55.14 <sup>76</sup>	36.346 <sup>98</sup>	43.75 <sup>106</sup>
July 9.2	46.223 <sup>62</sup>	54.58 <sup>34</sup>	42.241 <sup>63</sup>	69.80 <sup>53</sup>	2.325 <sup>120</sup>	54.38 <sup>111</sup>	36.248 <sup>85</sup>	42.69 <sup>124</sup>
19.1	46.161 <sup>46</sup>	54.92 <sup>23</sup>	42.178 <sup>47</sup>	70.33 <sup>46</sup>	2.205 <sup>95</sup>	53.27 <sup>143</sup>	36.163 <sup>68</sup>	41.45 <sup>126</sup>
29.1	46.115 <sup>25</sup>	55.15 <sup>11</sup>	42.131 <sup>27</sup>	70.79 <sup>37</sup>	2.110 <sup>63</sup>	51.84 <sup>174</sup>	36.095 <sup>48</sup>	40.10 <sup>143</sup>
Aug. 8.1	46.090 <sup>4</sup>	55.26 <sup>3</sup>	42.104 <sup>6</sup>	71.16 <sup>26</sup>	2.047 <sup>29</sup>	50.10 <sup>202</sup>	36.047 <sup>22</sup>	38.67 <sup>146</sup>
18.1	46.086 <sup>22</sup>	55.23 <sup>20</sup>	42.098 <sup>20</sup>	71.42 <sup>9</sup>	2.018 <sup>7</sup>	48.08 <sup>226</sup>	36.025 <sup>4</sup>	37.21 <sup>143</sup>
28.0	46.108 <sup>49</sup>	55.03 <sup>40</sup>	42.118 <sup>46</sup>	71.51 <sup>7</sup>	2.025 <sup>45</sup>	45.83 <sup>246</sup>	36.029 <sup>37</sup>	35.78 <sup>133</sup>
Sept. 7.0	46.157 <sup>82</sup>	54.63 <sup>59</sup>	42.164 <sup>78</sup>	71.44 <sup>28</sup>	2.070 <sup>87</sup>	43.37 <sup>265</sup>	36.066 <sup>73</sup>	34.45 <sup>115</sup>
17.0	46.239 <sup>115</sup>	54.04 <sup>83</sup>	42.242 <sup>113</sup>	71.16 <sup>50</sup>	2.157 <sup>133</sup>	40.72 <sup>278</sup>	36.139 <sup>112</sup>	33.30 <sup>93</sup>
26.9	46.354 <sup>151</sup>	53.21 <sup>107</sup>	42.355 <sup>149</sup>	70.66 <sup>77</sup>	2.290 <sup>180</sup>	37.94 <sup>285</sup>	36.251 <sup>153</sup>	32.37 <sup>62</sup>
Oct. 6.9	46.505 <sup>186</sup>	52.14 <sup>130</sup>	42.504 <sup>185</sup>	69.89 <sup>102</sup>	2.470 <sup>274</sup>	35.09 <sup>289</sup>	36.404 <sup>194</sup>	31.75 <sup>27</sup>
16.9	46.691 <sup>224</sup>	50.84 <sup>153</sup>	42.689 <sup>221</sup>	68.87 <sup>130</sup>	2.697 <sup>274</sup>	32.20 <sup>286</sup>	36.598 <sup>234</sup>	31.48 <sup>11</sup>
26.9	46.915 <sup>259</sup>	49.31 <sup>175</sup>	42.910 <sup>256</sup>	67.57 <sup>155</sup>	2.971 <sup>319</sup>	29.34 <sup>277</sup>	36.832 <sup>273</sup>	31.59 <sup>53</sup>
Nov. 5.8	47.174 <sup>288</sup>	47.56 <sup>191</sup>	43.166 <sup>286</sup>	66.02 <sup>176</sup>	3.290 <sup>359</sup>	26.57 <sup>259</sup>	37.105 <sup>305</sup>	32.12 <sup>96</sup>
15.8	47.462 <sup>312</sup>	45.65 <sup>204</sup>	43.452 <sup>311</sup>	64.26 <sup>195</sup>	3.649 <sup>391</sup>	23.98 <sup>237</sup>	37.410 <sup>329</sup>	33.08 <sup>137</sup>
25.8	47.774 <sup>328</sup>	43.61 <sup>213</sup>	43.763 <sup>325</sup>	62.31 <sup>210</sup>	4.040 <sup>414</sup>	21.61 <sup>205</sup>	37.739 <sup>345</sup>	34.45 <sup>173</sup>
Dec. 5.8	48.102 <sup>335</sup>	41.48 <sup>211</sup>	44.088 <sup>333</sup>	60.21 <sup>215</sup>	4.454 <sup>426</sup>	19.56 <sup>167</sup>	38.084 <sup>351</sup>	36.18 <sup>206</sup>
15.7	48.437 <sup>332</sup>	39.37 <sup>207</sup>	44.421 <sup>329</sup>	58.06 <sup>215</sup>	4.880 <sup>425</sup>	17.89 <sup>125</sup>	38.435 <sup>346</sup>	38.26 <sup>234</sup>
25.7	48.769 <sup>316</sup>	37.30 <sup>194</sup>	44.750 <sup>315</sup>	55.91 <sup>207</sup>	5.305 <sup>409</sup>	16.64 <sup>78</sup>	38.781 <sup>330</sup>	40.60 <sup>254</sup>
35.7	49.085	35.36	45.065	53.84	5.714	15.86	39.111	43.14
Mean Place	44.205	66.38	40.246	83.26	0.238	56.81	34.425	21.40
Sec $\delta$ , Tan $\delta$	1.009	+0.137	1.001	+0.042	1.413	+0.998	1.081	-0.412
$D\psi\alpha$ , $D_{\omega}\alpha$	+0.06	+0.01	+0.06	0.00	+0.07	+0.06	+0.06	-0.03
$D\psi\delta$ , $D_{\omega}\delta$	-0.4	+0.3	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Leonis. Mag. 2.6			$\theta$ Leonis. Mag. 3.4			$\gamma$ Ursæ Majoris. Mag. 3.7			$\delta$ Crateris. Mag. 3.8		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 11 9	s 11 9	° ' " +20 58	h m 11 9	s 11 9	° ' " +15 52	h m 11 13	s 11 13	° ' " +33 32	h m 11 15	s 11 15	° ' " -14 19
Jan. 0.7	43.491	327	29.04	54.783	317	47.89	61.774	355	33.07	12.819	313	47.82
10.7	43.818	296	27.61	55.100	290	46.29	62.129	326	32.08	13.132	284	50.27
20.6	44.114	258	26.52	55.390	252	44.98	62.455	284	31.51	13.416	246	52.71
30.6	44.372	214	25.78	55.642	209	43.98	62.739	237	31.38	13.662	204	55.09
Feb. 9.6	44.586	165	25.40	55.851	161	43.32	62.976	183	31.67	13.866	159	57.33
19.6	44.751	116	25.35	56.012	114	42.98	63.159	128	32.35	14.025	113	59.38
Mar. 1.5	44.867	68	25.63	56.126	66	42.94	63.287	74	33.35	14.138	68	61.23
11.5	44.935	22	26.17	56.192	23	43.18	63.361	23	34.63	14.206	28	62.83
21.5	44.957	18	26.94	56.215	16	43.64	63.384	62	36.08	14.234	7	64.19
31.4	44.939	50	27.85	56.200	47	44.28	63.361	160	37.65	14.227	39	65.29
Apr. 10.4	44.889	78	28.86	56.153	74	45.05	63.299	93	39.25	14.188	64	66.14
20.4	44.811	97	29.91	56.079	91	45.88	63.206	119	40.81	14.124	82	66.74
30.4	44.714	111	30.95	55.988	105	46.74	63.087	135	42.26	14.042	94	67.11
May 10.3	44.603	121	31.92	55.883	111	47.59	62.952	144	43.54	13.948	104	67.24
20.3	44.484	119	32.80	55.772	114	48.39	62.808	148	44.61	13.844	108	67.17
30.3	44.363	117	33.54	55.658	112	49.09	62.660	145	45.43	13.736	108	66.89
June 9.3	44.246	111	34.14	55.546	105	49.70	62.515	139	45.99	13.628	106	66.43
19.2	44.135	102	34.57	55.441	97	50.19	62.376	129	46.26	13.522	99	65.79
29.2	44.033	90	34.81	55.344	85	50.55	62.247	113	46.24	13.423	91	65.01
July 9.2	43.943	73	34.87	55.259	70	50.75	62.134	96	45.92	13.332	79	64.10
19.1	43.870	57	34.72	55.189	54	50.80	62.038	75	45.31	13.253	63	63.08
29.1	43.813	37	34.37	55.135	35	50.69	61.963	53	44.43	13.190	46	62.00
Aug. 8.1	43.776	12	33.83	55.100	12	50.39	61.910	26	43.27	13.144	23	60.89
18.1	43.764	14	33.06	55.088	14	49.92	61.884	36	41.86	13.121	32	59.80
28.0	43.778	41	32.10	55.102	41	49.24	61.887	36	40.20	13.123	32	58.78
Sept. 7.0	43.819	75	30.91	55.143	74	48.36	61.923	71	38.32	13.155	65	57.88
17.0	43.894	110	29.53	55.217	108	47.26	61.994	111	36.23	13.220	102	57.17
27.0	44.004	147	27.93	55.325	143	45.96	62.105	151	33.97	13.322	140	56.68
Oct. 6.9	44.151	185	26.14	55.468	183	44.45	62.256	194	31.56	13.462	180	56.48
16.9	44.336	225	24.19	55.651	220	42.73	62.450	235	29.05	13.642	220	56.60
26.9	44.561	262	22.08	55.871	256	40.84	62.685	276	26.47	13.862	257	57.06
Nov. 5.8	44.823	294	19.87	56.127	288	38.80	62.961	313	23.89	14.119	289	57.90
15.8	45.117	321	17.60	56.415	315	36.65	63.274	344	21.36	14.408	319	59.10
25.8	45.438	339	15.34	56.730	333	34.46	63.618	365	18.96	14.724	333	60.65
Dec. 5.8	45.777	349	13.15	57.063	342	32.28	63.983	377	16.76	15.057	340	62.48
15.7	46.126	349	11.10	57.405	341	30.19	64.360	378	14.81	15.397	338	64.58
25.7	46.475	336	9.23	57.746	328	28.23	64.738	366	13.20	15.735	324	66.86
35.7	46.811		7.64	58.074		26.49	65.104		11.97	16.059		69.25
Mean Place	41.824		43.01	53.160		60.32	59.997		50.74	11.376		45.19
Sec $\delta$ , Tan $\delta$	1.071		+0.383	1.040		+0.284	1.200		+0.663	1.032		-0.255
$D\psi\alpha$ , $D\omega\alpha$	+0.06		+0.02	+0.06		+0.02	+0.06		+0.04	+0.06		-0.02
$D\psi\delta$ , $D\omega\delta$	-0.04		+0.2	-0.4		+0.2	-0.4		+0.2	-0.4		+0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\sigma$ Leonis. Mag. 4.1		$\pi$ Centauri. Mag. 4.3		$\iota$ Leonis. Mag. 4.0		$\tau$ Leonis. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 16	° ' " + 6 28	h m 11 17	° ' " -54 2	h m 11 19	° ' " +10 58	h m 11 23	° ' " + 3 18
	s	"	s	"	s	"	s	"
Jan. 0.7	52.979 <sup>312</sup>	54.51 <sup>192</sup>	14.455 <sup>435</sup>	0.98 <sup>279</sup>	37.419 <sup>318</sup>	60.56 <sup>180</sup>	41.618 <sup>314</sup>	40.02 <sup>203</sup>
10.7	53.291 <sup>286</sup>	52.59 <sup>172</sup>	14.890 <sup>389</sup>	3.77 <sup>313</sup>	37.737 <sup>290</sup>	58.76 <sup>154</sup>	41.932 <sup>289</sup>	37.99 <sup>186</sup>
20.6	53.577 <sup>249</sup>	50.87 <sup>148</sup>	15.279 <sup>331</sup>	6.90 <sup>337</sup>	38.027 <sup>255</sup>	57.22 <sup>126</sup>	42.221 <sup>253</sup>	36.13 <sup>162</sup>
30.6	53.826 <sup>208</sup>	49.39 <sup>119</sup>	15.610 <sup>270</sup>	10.27 <sup>354</sup>	38.282 <sup>213</sup>	55.96 <sup>97</sup>	42.474 <sup>213</sup>	34.51 <sup>138</sup>
Feb. 9.6	54.034 <sup>163</sup>	48.20 <sup>91</sup>	15.880 <sup>208</sup>	13.81 <sup>359</sup>	38.495 <sup>169</sup>	54.99 <sup>65</sup>	42.687 <sup>169</sup>	33.13 <sup>110</sup>
19.6	54.197 <sup>117</sup>	47.29 <sup>61</sup>	16.063 <sup>135</sup>	17.40 <sup>358</sup>	38.664 <sup>121</sup>	54.34 <sup>34</sup>	42.856 <sup>123</sup>	32.03 <sup>81</sup>
Mar. 1.5	54.314 <sup>73</sup>	46.68 <sup>34</sup>	16.218 <sup>70</sup>	20.98 <sup>347</sup>	38.785 <sup>77</sup>	54.00 <sup>8</sup>	42.979 <sup>80</sup>	31.22 <sup>55</sup>
11.5	54.387 <sup>31</sup>	46.34 <sup>10</sup>	16.288 <sup>10</sup>	24.45 <sup>330</sup>	38.862 <sup>34</sup>	53.92 <sup>18</sup>	43.069 <sup>38</sup>	30.67 <sup>29</sup>
21.5	54.418 <sup>5</sup>	46.24 <sup>12</sup>	16.298 <sup>46</sup>	27.75 <sup>306</sup>	38.896 <sup>3</sup>	54.10 <sup>36</sup>	43.097 <sup>30</sup>	30.38 <sup>8</sup>
31.4	54.413 <sup>37</sup>	46.36 <sup>28</sup>	16.252 <sup>96</sup>	30.81 <sup>277</sup>	38.893 <sup>36</sup>	54.46 <sup>53</sup>	43.099 <sup>30</sup>	30.30 <sup>12</sup>
Apr. 10.4	54.376 <sup>62</sup>	46.64 <sup>42</sup>	16.156 <sup>137</sup>	33.58 <sup>243</sup>	38.857 <sup>61</sup>	54.99 <sup>64</sup>	43.069 <sup>54</sup>	30.42 <sup>20</sup>
20.4	54.314 <sup>81</sup>	47.06 <sup>52</sup>	16.019 <sup>173</sup>	36.01 <sup>205</sup>	38.796 <sup>81</sup>	55.63 <sup>72</sup>	43.015 <sup>75</sup>	30.71 <sup>40</sup>
30.4	54.233 <sup>93</sup>	47.58 <sup>59</sup>	15.846 <sup>301</sup>	38.06 <sup>163</sup>	38.715 <sup>94</sup>	56.35 <sup>73</sup>	42.940 <sup>88</sup>	31.11 <sup>48</sup>
May 10.3	54.140 <sup>101</sup>	48.17 <sup>62</sup>	15.645 <sup>221</sup>	39.69 <sup>119</sup>	38.621 <sup>102</sup>	57.08 <sup>73</sup>	42.852 <sup>97</sup>	31.59 <sup>56</sup>
20.3	54.039 <sup>104</sup>	48.79 <sup>63</sup>	15.424 <sup>236</sup>	40.88 <sup>73</sup>	38.519 <sup>107</sup>	57.81 <sup>69</sup>	42.755 <sup>101</sup>	32.15 <sup>60</sup>
30.3	53.935 <sup>104</sup>	49.42 <sup>62</sup>	15.188 <sup>244</sup>	41.61 <sup>26</sup>	38.412 <sup>107</sup>	58.50 <sup>64</sup>	42.654 <sup>102</sup>	32.75 <sup>61</sup>
June 9.3	53.831 <sup>100</sup>	50.04 <sup>59</sup>	14.944 <sup>246</sup>	41.87 <sup>21</sup>	38.305 <sup>102</sup>	59.14 <sup>57</sup>	42.552 <sup>99</sup>	33.36 <sup>61</sup>
19.2	53.731 <sup>93</sup>	50.63 <sup>54</sup>	14.698 <sup>240</sup>	41.66 <sup>67</sup>	38.203 <sup>95</sup>	59.71 <sup>47</sup>	42.453 <sup>94</sup>	33.97 <sup>59</sup>
29.2	53.638 <sup>83</sup>	51.17 <sup>48</sup>	14.458 <sup>228</sup>	40.99 <sup>112</sup>	38.108 <sup>86</sup>	60.18 <sup>35</sup>	42.359 <sup>85</sup>	34.56 <sup>56</sup>
July 9.2	53.555 <sup>70</sup>	51.65 <sup>39</sup>	14.230 <sup>208</sup>	39.87 <sup>152</sup>	38.022 <sup>73</sup>	60.53 <sup>24</sup>	42.274 <sup>73</sup>	35.12 <sup>50</sup>
19.1	53.485 <sup>57</sup>	52.04 <sup>30</sup>	14.022 <sup>182</sup>	38.35 <sup>188</sup>	37.949 <sup>58</sup>	60.77 <sup>11</sup>	42.201 <sup>60</sup>	35.62 <sup>42</sup>
29.1	53.428 <sup>38</sup>	52.34 <sup>17</sup>	13.840 <sup>147</sup>	36.47 <sup>219</sup>	37.891 <sup>40</sup>	60.88 <sup>4</sup>	42.141 <sup>44</sup>	36.04 <sup>32</sup>
Aug. 8.1	53.390 <sup>17</sup>	52.51 <sup>4</sup>	13.693 <sup>105</sup>	34.28 <sup>240</sup>	37.851 <sup>19</sup>	60.84 <sup>22</sup>	42.097 <sup>23</sup>	36.36 <sup>19</sup>
18.1	53.373 <sup>5</sup>	52.55 <sup>14</sup>	13.588 <sup>56</sup>	31.88 <sup>256</sup>	37.832 <sup>3</sup>	60.62 <sup>38</sup>	42.074 <sup>0</sup>	36.55 <sup>5</sup>
28.0	53.378 <sup>35</sup>	52.41 <sup>32</sup>	13.532 <sup>1</sup>	29.32 <sup>261</sup>	37.835 <sup>33</sup>	60.24 <sup>59</sup>	42.074 <sup>28</sup>	36.60 <sup>14</sup>
Sept. 7.0	53.413 <sup>65</sup>	52.09 <sup>52</sup>	13.533 <sup>61</sup>	26.71 <sup>255</sup>	37.868 <sup>63</sup>	59.65 <sup>81</sup>	42.102 <sup>59</sup>	36.46 <sup>34</sup>
17.0	53.478 <sup>98</sup>	51.57 <sup>76</sup>	13.594 <sup>126</sup>	24.16 <sup>240</sup>	37.931 <sup>96</sup>	58.84 <sup>102</sup>	42.161 <sup>91</sup>	36.12 <sup>56</sup>
27.0	53.576 <sup>136</sup>	50.81 <sup>100</sup>	13.720 <sup>195</sup>	21.76 <sup>214</sup>	38.027 <sup>134</sup>	57.82 <sup>148</sup>	42.252 <sup>129</sup>	35.56 <sup>82</sup>
Oct. 6.9	53.712 <sup>173</sup>	49.81 <sup>125</sup>	13.915 <sup>260</sup>	19.62 <sup>179</sup>	38.161 <sup>172</sup>	56.56 <sup>167</sup>	42.381 <sup>167</sup>	34.74 <sup>108</sup>
16.9	53.885 <sup>211</sup>	48.56 <sup>148</sup>	14.175 <sup>825</sup>	17.83 <sup>134</sup>	38.333 <sup>210</sup>	55.08 <sup>170</sup>	42.548 <sup>205</sup>	33.66 <sup>133</sup>
26.9	54.096 <sup>248</sup>	47.08 <sup>171</sup>	14.500 <sup>381</sup>	16.49 <sup>83</sup>	38.543 <sup>247</sup>	53.38 <sup>187</sup>	42.753 <sup>243</sup>	32.33 <sup>158</sup>
Nov. 5.8	54.344 <sup>279</sup>	45.37 <sup>189</sup>	14.881 <sup>429</sup>	15.66 <sup>26</sup>	38.790 <sup>279</sup>	51.51 <sup>203</sup>	42.996 <sup>275</sup>	30.75 <sup>179</sup>
15.8	54.623 <sup>307</sup>	43.48 <sup>204</sup>	15.310 <sup>464</sup>	15.40 <sup>33</sup>	39.069 <sup>307</sup>	49.48 <sup>215</sup>	43.271 <sup>303</sup>	28.96 <sup>197</sup>
25.8	54.930 <sup>324</sup>	41.44 <sup>213</sup>	15.774 <sup>485</sup>	15.73 <sup>93</sup>	39.376 <sup>327</sup>	47.33 <sup>217</sup>	43.574 <sup>323</sup>	26.99 <sup>211</sup>
Dec. 5.8	55.254 <sup>335</sup>	39.31 <sup>216</sup>	16.259 <sup>491</sup>	16.66 <sup>151</sup>	39.703 <sup>337</sup>	45.16 <sup>215</sup>	43.897 <sup>333</sup>	24.88 <sup>216</sup>
15.7	55.589 <sup>334</sup>	37.15 <sup>211</sup>	16.750 <sup>482</sup>	18.17 <sup>204</sup>	40.040 <sup>337</sup>	43.01 <sup>206</sup>	44.230 <sup>333</sup>	22.72 <sup>216</sup>
25.7	55.923 <sup>322</sup>	35.04 <sup>200</sup>	17.232 <sup>455</sup>	20.21 <sup>251</sup>	40.377 <sup>328</sup>	40.95 <sup>191</sup>	44.563 <sup>324</sup>	20.56 <sup>207</sup>
35.7	56.245	33.04	17.687	22.72	40.705	39.04	44.887	18.49
Mean Place	51.460	64.09	12.999	9.66	35.891	71.67	40.156	48.67
Sec $\delta$ , Tan $\delta$	1.006	+0.114	1.703	-1.378	1.019	+0.194	1.002	+0.058
$D\phi\alpha$ , $D\omega\alpha$	+0.06	+0.01	+0.05	-0.09	+0.06	+0.01	+0.06	0.00
$D\phi\delta$ , $D\omega\delta$	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2	-0.4	+0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\lambda$ Draconis. Mag. 4.1		$\xi$ Hydraz. Mag. 3.7		$\lambda$ Centauri. Mag. 3.3		$\nu$ Leonis. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 26	° ' " +69 46	h m 11 28	° ' " -31 23	h m 11 31	° ' " -62 33	h m 11 32	° ' " - 0 21
	s	"	s	"	s	"	s	"
Jan. 0.7	32.52	56.70	56.346	51.29	58.05	27.40	43.336	62.91
10.7	33.24 <sup>72</sup>	56.84 <sup>14</sup>	56.690 <sup>344</sup>	53.93 <sup>204</sup>	58.59 <sup>54</sup>	29.97 <sup>257</sup>	43.654 <sup>318</sup>	65.03 <sup>212</sup>
20.6	33.91 <sup>67</sup>	57.58 <sup>74</sup>	57.004 <sup>314</sup>	56.73 <sup>280</sup>	59.07 <sup>48</sup>	32.95 <sup>298</sup>	43.945 <sup>291</sup>	67.02 <sup>199</sup>
30.6	34.50 <sup>59</sup>	58.89 <sup>131</sup>	57.279 <sup>275</sup>	59.62 <sup>289</sup>	59.49 <sup>42</sup>	36.25 <sup>330</sup>	44.203 <sup>258</sup>	68.82 <sup>180</sup>
Feb. 9.6	34.98 <sup>48</sup>	60.72 <sup>183</sup>	57.509 <sup>230</sup>	62.53 <sup>201</sup>	59.84 <sup>35</sup>	39.81 <sup>356</sup>	44.422 <sup>219</sup>	70.38 <sup>156</sup>
19.6	35.36 <sup>38</sup>	62.98 <sup>226</sup>	57.690 <sup>181</sup>	65.37 <sup>284</sup>	60.11 <sup>27</sup>	43.49 <sup>368</sup>	44.598 <sup>176</sup>	71.70 <sup>132</sup>
Mar. 1.5	35.62 <sup>26</sup>	65.56 <sup>258</sup>	57.823 <sup>133</sup>	68.09 <sup>272</sup>	60.30 <sup>19</sup>	47.22 <sup>373</sup>	44.730 <sup>132</sup>	72.73 <sup>103</sup>
11.5	35.75 <sup>13</sup>	68.35 <sup>279</sup>	57.907 <sup>84</sup>	70.62 <sup>253</sup>	60.41 <sup>11</sup>	50.92 <sup>370</sup>	44.818 <sup>88</sup>	73.50 <sup>77</sup>
21.5	35.75 <sup>0</sup>	71.22 <sup>287</sup>	57.947 <sup>40</sup>	72.95 <sup>233</sup>	60.44 <sup>3</sup>	54.49 <sup>357</sup>	44.866 <sup>48</sup>	74.02 <sup>52</sup>
31.5	35.63 <sup>12</sup>	74.07 <sup>285</sup>	57.948 <sup>1</sup>	75.01 <sup>206</sup>	60.40 <sup>4</sup>	57.88 <sup>339</sup>	44.877 <sup>11</sup>	74.30 <sup>28</sup>
Apr. 10.4	35.42 <sup>21</sup>	76.77 <sup>270</sup>	57.913 <sup>35</sup>	76.81 <sup>180</sup>	60.29 <sup>11</sup>	61.02 <sup>314</sup>	44.856 <sup>21</sup>	74.38 <sup>8</sup>
20.4	35.11 <sup>31</sup>	79.22 <sup>245</sup>	57.849 <sup>64</sup>	78.31 <sup>150</sup>	60.13 <sup>16</sup>	63.84 <sup>282</sup>	44.810 <sup>46</sup>	74.28 <sup>10</sup>
30.4	34.73 <sup>38</sup>	81.33 <sup>211</sup>	57.762 <sup>87</sup>	79.49 <sup>118</sup>	59.92 <sup>21</sup>	66.30 <sup>246</sup>	44.743 <sup>67</sup>	74.03 <sup>25</sup>
May 10.3	34.28 <sup>45</sup>	83.03 <sup>170</sup>	57.657 <sup>105</sup>	80.36 <sup>87</sup>	59.67 <sup>25</sup>	68.35 <sup>205</sup>	44.662 <sup>81</sup>	73.66 <sup>37</sup>
20.3	33.80 <sup>48</sup>	84.26 <sup>123</sup>	57.537 <sup>120</sup>	80.90 <sup>54</sup>	59.38 <sup>29</sup>	69.95 <sup>160</sup>	44.571 <sup>91</sup>	73.20 <sup>46</sup>
30.3	33.30 <sup>50</sup>	85.00 <sup>74</sup>	57.409 <sup>128</sup>	81.11 <sup>21</sup>	59.07 <sup>31</sup>	71.07 <sup>112</sup>	44.474 <sup>97</sup>	72.66 <sup>54</sup>
June 9.3	32.80 <sup>50</sup>	85.21 <sup>21</sup>	57.276 <sup>133</sup>	81.00 <sup>11</sup>	58.74 <sup>33</sup>	71.69 <sup>62</sup>	44.374 <sup>100</sup>	72.08 <sup>58</sup>
19.2	32.30 <sup>50</sup>	84.90 <sup>31</sup>	57.142 <sup>134</sup>	80.57 <sup>43</sup>	58.40 <sup>34</sup>	71.81 <sup>12</sup>	44.275 <sup>99</sup>	71.46 <sup>62</sup>
29.2	31.82 <sup>48</sup>	84.07 <sup>83</sup>	57.011 <sup>131</sup>	79.83 <sup>74</sup>	58.07 <sup>33</sup>	71.43 <sup>38</sup>	44.180 <sup>95</sup>	70.82 <sup>64</sup>
July 9.2	31.39 <sup>43</sup>	82.74 <sup>133</sup>	56.888 <sup>123</sup>	78.82 <sup>101</sup>	57.74 <sup>33</sup>	70.55 <sup>88</sup>	44.092 <sup>88</sup>	70.19 <sup>63</sup>
19.2	31.00 <sup>39</sup>	80.95 <sup>179</sup>	56.775 <sup>113</sup>	77.55 <sup>127</sup>	57.43 <sup>31</sup>	69.21 <sup>134</sup>	44.013 <sup>79</sup>	69.59 <sup>60</sup>
29.1	30.66 <sup>34</sup>	78.73 <sup>222</sup>	56.676 <sup>99</sup>	76.08 <sup>147</sup>	57.16 <sup>27</sup>	67.46 <sup>175</sup>	43.948 <sup>65</sup>	69.03 <sup>56</sup>
Aug. 8.1	30.39 <sup>27</sup>	76.13 <sup>260</sup>	56.598 <sup>78</sup>	74.43 <sup>165</sup>	56.93 <sup>23</sup>	65.32 <sup>214</sup>	43.897 <sup>51</sup>	68.55 <sup>48</sup>
18.1	30.20 <sup>19</sup>	73.21 <sup>292</sup>	56.544 <sup>54</sup>	72.70 <sup>173</sup>	56.74 <sup>19</sup>	62.89 <sup>243</sup>	43.866 <sup>31</sup>	68.17 <sup>38</sup>
28.0	30.08 <sup>12</sup>	70.02 <sup>319</sup>	56.520 <sup>24</sup>	70.93 <sup>177</sup>	56.62 <sup>12</sup>	60.24 <sup>265</sup>	43.856 <sup>10</sup>	67.93 <sup>24</sup>
Sept. 7.0	30.05 <sup>3</sup>	66.62 <sup>340</sup>	56.530 <sup>10</sup>	69.19 <sup>174</sup>	56.57 <sup>5</sup>	57.48 <sup>276</sup>	43.875 <sup>19</sup>	67.84 <sup>9</sup>
17.0	30.10 <sup>5</sup>	63.07 <sup>355</sup>	56.578 <sup>48</sup>	67.57 <sup>162</sup>	56.60 <sup>3</sup>	54.69 <sup>279</sup>	43.923 <sup>48</sup>	67.95 <sup>11</sup>
27.0	30.24 <sup>14</sup>	59.44 <sup>363</sup>	56.670 <sup>92</sup>	66.14 <sup>143</sup>	56.73 <sup>13</sup>	51.99 <sup>270</sup>	44.006 <sup>83</sup>	68.30 <sup>35</sup>
Oct. 6.9	30.47 <sup>23</sup>	55.81 <sup>363</sup>	56.808 <sup>138</sup>	64.98 <sup>116</sup>	56.93 <sup>20</sup>	49.50 <sup>249</sup>	44.126 <sup>120</sup>	68.90 <sup>60</sup>
16.9	30.80 <sup>33</sup>	52.27 <sup>354</sup>	56.993 <sup>185</sup>	64.16 <sup>82</sup>	57.22 <sup>29</sup>	47.33 <sup>217</sup>	44.285 <sup>159</sup>	69.76 <sup>86</sup>
26.9	31.23 <sup>43</sup>	48.86 <sup>341</sup>	57.224 <sup>231</sup>	63.74 <sup>42</sup>	57.59 <sup>37</sup>	45.56 <sup>177</sup>	44.484 <sup>199</sup>	70.91 <sup>115</sup>
Nov. 5.9	31.74 <sup>51</sup>	45.70 <sup>316</sup>	57.498 <sup>274</sup>	63.75 <sup>1</sup>	58.04 <sup>45</sup>	44.28 <sup>128</sup>	44.720 <sup>236</sup>	72.32 <sup>141</sup>
15.8	32.33 <sup>59</sup>	42.85 <sup>285</sup>	57.811 <sup>313</sup>	64.23 <sup>48</sup>	58.55 <sup>51</sup>	43.56 <sup>72</sup>	44.992 <sup>272</sup>	73.99 <sup>167</sup>
25.8	32.99 <sup>66</sup>	40.40 <sup>245</sup>	58.154 <sup>343</sup>	65.18 <sup>95</sup>	59.12 <sup>57</sup>	43.45 <sup>11</sup>	45.292 <sup>300</sup>	75.87 <sup>188</sup>
Dec. 5.8	33.70 <sup>71</sup>	38.43 <sup>197</sup>	58.517 <sup>363</sup>	66.57 <sup>139</sup>	59.70 <sup>58</sup>	43.97 <sup>52</sup>	45.612 <sup>332</sup>	77.91 <sup>204</sup>
15.7	34.44 <sup>74</sup>	37.00 <sup>143</sup>	58.890 <sup>373</sup>	68.39 <sup>182</sup>	60.30 <sup>60</sup>	45.09 <sup>112</sup>	45.944 <sup>332</sup>	80.06 <sup>215</sup>
25.7	35.19 <sup>75</sup>	36.15 <sup>85</sup>	59.260 <sup>370</sup>	70.57 <sup>218</sup>	60.88 <sup>58</sup>	46.81 <sup>172</sup>	46.278 <sup>334</sup>	82.25 <sup>219</sup>
35.7	35.93 <sup>74</sup>	35.92 <sup>23</sup>	59.616 <sup>356</sup>	73.05 <sup>248</sup>	61.45 <sup>57</sup>	49.06 <sup>225</sup>	46.603 <sup>325</sup>	84.40 <sup>215</sup>
Mean Place	29.629	81.55	55.004	54.02	56.642	37.87	41.941	55.34
Sec $\delta$ , Tan $\delta$	2.894	+2.716	1.172	-0.610	2.170	-1.926	1.000	-0.006
$D\psi a$ , $D_\omega a$	+0.07	+0.18	+0.06	-0.04	+0.05	-0.13	+0.06	0.00
$D\psi \delta$ , $D_\omega \delta$	-0.4	+0.1	-0.4	+0.1	-0.4	+0.1	-0.4	+0.1

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi$ Chamæleontis. Mag. 5.7			$\beta$ Draconis. Mag. 5.5			$\zeta$ Crateris. Mag. 4.9			$\chi$ Ursæ Majoris. Mag. 3.8		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	"	h m	s	"	h m	s	"	h m	s	"
	11 33		-75 26	11 37		+67 11	11 40		-17 53	11 41		+48 13
Jan. 0.7	51.35	1.09	53.86	50.55	34.527	22.95	42.205	60.65	75			
10.7	52.25	3.45	54.52	50.46	34.856	25.38	42.636	59.90	20			
20.7	53.06	6.30	55.13	50.99	35.159	27.86	43.038	59.70	33			
30.6	53.76	9.54	55.68	52.10	35.428	30.32	43.398	60.03	33			
Feb. 9.6	54.32	13.10	56.14	53.74	35.657	32.68	43.706	60.87	84			
19.6	54.76	16.85	56.51	55.84	35.844	34.91	43.954	62.17	130			
Mar. 1.5	55.05	20.73	56.77	58.29	35.985	36.94	44.136	63.86	169			
11.5	55.20	24.63	56.92	60.99	36.082	38.76	44.254	65.83	197			
21.5	55.21	28.47	56.96	63.81	36.137	40.33	44.307	68.01	218			
31.5	55.10	32.18	56.89	66.65	36.156	41.67	44.299	70.29	228			
Apr. 10.4	54.87	35.66	56.73	69.38	36.141	42.75	44.237	72.57	228			
20.4	54.51	38.85	56.48	71.89	36.100	43.58	44.130	74.74	217			
30.4	54.07	41.70	56.17	74.10	36.037	44.16	43.986	76.74	200			
May 10.4	53.53	44.13	55.80	75.93	35.957	44.51	43.812	78.48	174			
20.3	52.96	46.12	55.39	77.32	35.865	44.62	43.619	79.92	144			
30.3	52.31	47.61	54.96	78.23	35.764	44.51	43.414	81.00	108			
June 9.3	51.62	48.58	54.52	78.64	35.658	44.19	43.204	81.69	69			
19.2	50.91	49.00	54.08	78.53	35.550	43.68	42.996	81.97	28			
29.2	50.20	48.88	53.66	77.91	35.444	42.97	42.795	81.84	13			
July 9.2	49.51	48.23	53.27	76.79	35.342	42.12	42.608	81.30	54			
19.2	48.86	47.05	52.91	75.20	35.249	41.14	42.440	80.37	93			
29.1	48.27	45.38	52.60	73.17	35.167	40.05	42.293	79.05	132			
Aug. 8.1	47.76	43.28	52.34	70.74	35.101	38.90	42.173	77.36	169			
18.1	47.35	40.82	52.14	67.98	35.054	37.73	42.085	75.34	202			
28.1	47.07	38.08	52.02	64.92	35.032	36.59	42.031	73.04	230			
Sept. 7.0	46.92	35.15	51.96	61.62	35.038	35.54	42.017	70.46	258			
17.0	46.91	32.14	51.98	58.14	35.078	34.63	42.047	67.68	278			
27.0	47.08	29.17	52.08	54.57	35.155	33.94	42.125	64.72	296			
Oct. 6.9	47.40	26.35	52.27	50.95	35.272	33.50	42.253	61.62	310			
16.9	47.87	23.80	52.54	47.37	35.432	33.37	42.435	58.47	315			
26.9	48.50	21.64	52.89	43.92	35.634	33.59	42.671	55.32	315			
Nov. 5.9	49.25	19.96	53.34	40.65	35.876	34.17	42.959	52.25	307			
15.8	50.11	18.83	53.85	37.68	36.155	35.12	43.296	49.32	293			
25.8	51.05	18.32	54.43	35.09	36.466	36.44	43.674	46.63	269			
Dec. 5.8	52.04	18.45	55.06	32.93	36.798	38.10	44.086	44.24	239			
15.8	53.05	19.23	55.73	31.29	37.143	40.05	44.520	42.24	200			
25.7	54.05	20.65	56.41	30.23	37.488	42.25	44.963	40.68	156			
35.7	54.99	22.66	57.08	29.77	37.827	44.60	45.400	39.63	105			
Mean Place	49.733	13.46	51.393	75.59	33.229	21.29	40.449	82.74				
Sec $\delta$ , Tan $\delta$	3.978	-3.850	2.580	+2.379	1.051	-0.323	1.501	+1.120				
$D\psi\alpha$ , $D\omega\alpha$	+0.05	-0.25	+0.07	+0.16	+0.06	-0.02	+0.06	+0.07				
$D\psi\delta$ , $D\omega\delta$	-0.4	+0.1	-0.4	+0.1	-0.4	+0.1	-0.4	+0.1				

## FOR THE UPPER TRANSIT AT WASHINGTON

Washington Mean Time.	$\beta$ Leonis. (Denebola.) Mag. 2.2			$\beta$ Virginis. Mag. 3.8			Groombridge 1830. Mag. 6.5			$\gamma$ Ursæ Majoris. Mag. 2.5		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 11 44	s	° ' "	h m 11 46	s	° ' "	h m 11 48	s	° ' "	h m 11 49	s	° ' "
Jan. 0.7	51.049		56.95	23.638		48.49	13.562		32.15	30.139		58.97
10.7	51.378 <sup>329</sup>		55.18	23.962 <sup>324</sup>		46.41 <sup>208</sup>	13.954 <sup>392</sup>		30.87 <sup>128</sup>	30.617 <sup>478</sup>		58.33
20.7	51.684 <sup>306</sup>		53.69	24.262 <sup>300</sup>		44.48 <sup>193</sup>	14.323 <sup>369</sup>		30.07 <sup>80</sup>	31.065 <sup>448</sup>		58.26
30.6	51.959 <sup>275</sup>		52.53	24.532 <sup>270</sup>		42.78 <sup>170</sup>	14.656 <sup>333</sup>		29.77 <sup>30</sup>	31.470 <sup>405</sup>		58.77
Feb. 9.6	52.196 <sup>237</sup>		51.72	24.765 <sup>233</sup>		41.31 <sup>147</sup>	14.945 <sup>289</sup>		29.94 <sup>17</sup>	31.819 <sup>349</sup>		59.81
19.6	52.388 <sup>192</sup>		51.24	24.955 <sup>190</sup>		40.13 <sup>118</sup>	15.182 <sup>237</sup>		30.55 <sup>61</sup>	32.102 <sup>283</sup>		61.32
Mar. 1.6	52.535 <sup>147</sup>		51.11	25.101 <sup>146</sup>		39.22 <sup>91</sup>	15.363 <sup>181</sup>		31.56 <sup>101</sup>	32.315 <sup>213</sup>		63.23
11.5	52.636 <sup>101</sup>		51.28	25.205 <sup>104</sup>		38.60 <sup>62</sup>	15.489 <sup>126</sup>		32.88 <sup>132</sup>	32.452 <sup>137</sup>		65.45
21.5	52.695 <sup>59</sup>		51.69	25.268 <sup>63</sup>		38.23 <sup>37</sup>	15.561 <sup>72</sup>		34.45 <sup>157</sup>	32.517 <sup>65</sup>		67.86
31.5	52.713 <sup>18</sup>		52.33	25.293 <sup>25</sup>		38.11 <sup>12</sup>	15.583 <sup>22</sup>		36.17 <sup>172</sup>	32.511 <sup>6</sup>		70.36
Apr. 10.4	52.698 <sup>15</sup>		53.12	25.287 <sup>6</sup>		38.18 <sup>7</sup>	15.559 <sup>24</sup>		37.94 <sup>177</sup>	32.444 <sup>67</sup>		72.86
20.4	52.655 <sup>43</sup>		54.02	25.253 <sup>34</sup>		38.42 <sup>24</sup>	15.496 <sup>63</sup>		39.68 <sup>174</sup>	32.322 <sup>122</sup>		75.24
30.4	52.587 <sup>68</sup>		54.96	25.198 <sup>55</sup>		38.79 <sup>37</sup>	15.403 <sup>93</sup>		41.32 <sup>164</sup>	32.155 <sup>167</sup>		77.40
May 10.4	52.503 <sup>84</sup>		55.91	25.126 <sup>82</sup>		39.27 <sup>48</sup>	15.285 <sup>118</sup>		42.79 <sup>147</sup>	31.952 <sup>203</sup>		79.30
20.3	52.407 <sup>96</sup>		56.82	25.042 <sup>74</sup>		39.82 <sup>55</sup>	15.150 <sup>135</sup>		44.03 <sup>124</sup>	31.724 <sup>228</sup>		80.84
30.3	52.303 <sup>104</sup>		57.67	24.950 <sup>92</sup>		40.41 <sup>59</sup>	15.004 <sup>146</sup>		45.00 <sup>97</sup>	31.479 <sup>245</sup>		81.98
June 9.3	52.195 <sup>108</sup>		58.41	24.854 <sup>96</sup>		41.03 <sup>62</sup>	14.853 <sup>151</sup>		45.65 <sup>65</sup>	31.226 <sup>253</sup>		82.70
19.3	52.087 <sup>108</sup>		59.03	24.757 <sup>97</sup>		41.65 <sup>62</sup>	14.703 <sup>150</sup>		45.97 <sup>32</sup>	30.973 <sup>253</sup>		82.97
29.2	51.982 <sup>105</sup>		59.52	24.661 <sup>96</sup>		42.26 <sup>61</sup>	14.557 <sup>146</sup>		45.96 <sup>1</sup>	30.727 <sup>246</sup>		82.79
July 9.2	51.883 <sup>99</sup>		59.85	24.570 <sup>91</sup>		42.84 <sup>58</sup>	14.420 <sup>137</sup>		45.59 <sup>37</sup>	30.495 <sup>232</sup>		82.17
19.2	51.793 <sup>90</sup>		60.01	24.487 <sup>83</sup>		43.36 <sup>52</sup>	14.297 <sup>123</sup>		44.87 <sup>72</sup>	30.283 <sup>212</sup>		81.10
29.1	51.714 <sup>79</sup>		60.00	24.415 <sup>72</sup>		43.81 <sup>45</sup>	14.189 <sup>108</sup>		43.82 <sup>105</sup>	30.094 <sup>189</sup>		79.62
Aug. 8.1	51.652 <sup>62</sup>		59.80	24.356 <sup>59</sup>		44.17 <sup>36</sup>	14.102 <sup>87</sup>		42.44 <sup>138</sup>	29.937 <sup>157</sup>		77.77
18.1	51.607 <sup>45</sup>		59.41	24.314 <sup>42</sup>		44.40 <sup>23</sup>	14.040 <sup>62</sup>		40.74 <sup>170</sup>	29.817 <sup>121</sup>		75.55
28.1	51.586 <sup>21</sup>		58.80	24.295 <sup>19</sup>		44.50 <sup>10</sup>	14.007 <sup>33</sup>		38.75 <sup>199</sup>	29.734 <sup>82</sup>		73.01
Sept. 7.0	51.590 <sup>4</sup>		57.98	24.301 <sup>6</sup>		44.42 <sup>8</sup>	14.005 <sup>2</sup>		36.51 <sup>224</sup>	29.696 <sup>38</sup>		70.22
17.0	51.625 <sup>35</sup>		56.94	24.338 <sup>104</sup>		44.14 <sup>28</sup>	14.041 <sup>36</sup>		34.02 <sup>249</sup>	29.708 <sup>12</sup>		67.19
27.0	51.694 <sup>69</sup>		55.66	24.409 <sup>71</sup>		43.63 <sup>51</sup>	14.117 <sup>76</sup>		31.35 <sup>267</sup>	29.774 <sup>66</sup>		63.99
Oct. 7.0	51.801 <sup>107</sup>		54.17	24.516 <sup>107</sup>		42.87 <sup>76</sup>	14.237 <sup>120</sup>		28.50 <sup>285</sup>	29.897 <sup>123</sup>		60.68
16.9	51.948 <sup>147</sup>		52.45	24.664 <sup>148</sup>		41.86 <sup>101</sup>	14.404 <sup>167</sup>		25.53 <sup>297</sup>	30.081 <sup>184</sup>		57.33
26.9	52.135 <sup>187</sup>		50.55	24.851 <sup>187</sup>		40.57 <sup>129</sup>	14.618 <sup>214</sup>		22.50 <sup>303</sup>	30.325 <sup>244</sup>		54.01
Nov. 5.9	52.362 <sup>227</sup>		48.46	25.078 <sup>227</sup>		39.05 <sup>152</sup>	14.879 <sup>261</sup>		19.46 <sup>304</sup>	30.628 <sup>303</sup>		50.78
15.8	52.627 <sup>265</sup>		46.26	25.341 <sup>263</sup>		37.29 <sup>176</sup>	15.183 <sup>304</sup>		16.47 <sup>299</sup>	30.987 <sup>359</sup>		47.74
25.8	52.924 <sup>297</sup>		43.98	25.636 <sup>295</sup>		35.35 <sup>194</sup>	15.526 <sup>343</sup>		13.63 <sup>284</sup>	31.395 <sup>408</sup>		44.95
Dec. 5.8	53.244 <sup>320</sup>		41.70	25.953 <sup>317</sup>		33.25 <sup>210</sup>	15.898 <sup>372</sup>		11.02 <sup>261</sup>	31.842 <sup>447</sup>		42.52
15.8	53.580 <sup>336</sup>		39.47	26.285 <sup>332</sup>		31.07 <sup>218</sup>	16.293 <sup>395</sup>		8.69 <sup>233</sup>	32.315 <sup>473</sup>		40.52
25.7	53.921 <sup>341</sup>		37.37	26.621 <sup>336</sup>		28.89 <sup>218</sup>	16.696 <sup>403</sup>		6.72 <sup>197</sup>	32.802 <sup>487</sup>		39.00
35.7	54.256 <sup>335</sup>		35.47	26.951 <sup>330</sup>		26.75 <sup>214</sup>	17.092 <sup>396</sup>		5.18 <sup>154</sup>	33.286 <sup>484</sup>		38.04
Mean Place	49.653		69.92	22.311		57.16	12.010		52.10	28.353		82.47
Sec $\delta$ , Tan $\delta$	1.035		+0.268	1.001		+0.039	1.274		+0.790	1.707		+1.384
$D\psi\alpha$ , $D\omega\alpha$	+0.06		+0.02	+0.06		0.00	+0.06		+0.05	+0.06		+0.09
$D\psi\delta$ , $D\omega\delta$	-0.4		+0.1	-0.4		+0.1	-0.4		+0.1	-0.4		0.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi$ Virginis. Mag. 4.6		$\sigma$ Virginis. Mag. 4.2		$\delta$ Centauri. Mag. 2.9		$\epsilon$ Corvi. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 11 56	° ' " + 7 4	h m 12 0	° ' " + 9 11	h m 12 4	° ' " - 50 15	h m 12 5	° ' " - 22 9
	s	"	s	"	s	"	s	"
Jan. 0.7	38.464	27.24	60.174	26.68	4.108	29.24	52.358	30.00
10.7	38.792 <sup>328</sup>	25.24 <sup>200</sup>	60.504 <sup>330</sup>	24.72 <sup>196</sup>	4.555 <sup>447</sup>	31.57 <sup>233</sup>	52.702 <sup>344</sup>	32.36 <sup>236</sup>
20.7	39.098 <sup>306</sup>	23.46 <sup>178</sup>	60.812 <sup>308</sup>	23.00 <sup>172</sup>	4.971 <sup>416</sup>	34.27 <sup>270</sup>	53.025 <sup>323</sup>	34.81 <sup>245</sup>
30.6	39.376 <sup>278</sup>	21.94 <sup>152</sup>	61.093 <sup>281</sup>	21.55 <sup>145</sup>	5.345 <sup>374</sup>	37.25 <sup>298</sup>	53.317 <sup>292</sup>	37.30 <sup>249</sup>
Feb. 9.6	39.616 <sup>240</sup>	20.70 <sup>124</sup>	61.337 <sup>244</sup>	20.41 <sup>114</sup>	5.668 <sup>323</sup>	40.42 <sup>317</sup>	53.571 <sup>254</sup>	39.76 <sup>246</sup>
	199	94	204	82	268	328	213	235
19.6	39.815	19.76	61.541	19.59	5.936	43.70	53.784	42.11
Mar. 1.6	39.971 <sup>156</sup>	19.14 <sup>62</sup>	61.701 <sup>160</sup>	19.10 <sup>49</sup>	6.146 <sup>210</sup>	47.02 <sup>332</sup>	53.954 <sup>170</sup>	44.33 <sup>222</sup>
	114	32	117	21	150	328	126	202
11.5	40.085 <sup>72</sup>	18.82 <sup>6</sup>	61.818 <sup>76</sup>	18.89 <sup>7</sup>	6.296 <sup>95</sup>	50.30 <sup>317</sup>	54.080 <sup>85</sup>	46.35 <sup>180</sup>
21.5	40.157 <sup>33</sup>	18.76 <sup>18</sup>	61.884 <sup>37</sup>	18.96 <sup>49</sup>	6.391 <sup>43</sup>	53.47 <sup>299</sup>	54.165 <sup>12</sup>	48.15 <sup>159</sup>
31.5	40.190 <sup>1</sup>	18.94 <sup>36</sup>	61.931 <sup>4</sup>	19.28 <sup>49</sup>	6.434 <sup>6</sup>	56.46 <sup>278</sup>	54.212 <sup>12</sup>	49.74 <sup>134</sup>
Apr. 10.5	40.191	19.30	61.935	19.77	6.428	59.24	54.224	51.08
20.4	40.162 <sup>29</sup>	19.82 <sup>52</sup>	61.909 <sup>26</sup>	20.40 <sup>63</sup>	6.379 <sup>49</sup>	61.74 <sup>250</sup>	54.206 <sup>18</sup>	52.17 <sup>109</sup>
30.4	40.112 <sup>50</sup>	20.45 <sup>63</sup>	61.861 <sup>48</sup>	21.15 <sup>75</sup>	6.291 <sup>88</sup>	63.94 <sup>220</sup>	54.164 <sup>42</sup>	53.02 <sup>85</sup>
May 10.4	40.043 <sup>99</sup>	21.15 <sup>70</sup>	61.793 <sup>68</sup>	21.94 <sup>79</sup>	6.170 <sup>121</sup>	65.78 <sup>184</sup>	54.101 <sup>63</sup>	53.61 <sup>59</sup>
20.3	39.960 <sup>83</sup>	21.87 <sup>72</sup>	61.711 <sup>82</sup>	22.75 <sup>81</sup>	6.022 <sup>148</sup>	67.23 <sup>145</sup>	54.021 <sup>80</sup>	53.96 <sup>35</sup>
	92	74	92	79	172	106	92	11
30.3	39.868	22.61	61.619	23.54	5.850	68.29	53.929	54.07
June 9.3	39.771 <sup>97</sup>	23.31 <sup>70</sup>	61.521 <sup>98</sup>	24.29 <sup>75</sup>	5.661 <sup>189</sup>	68.93 <sup>64</sup>	53.826 <sup>103</sup>	53.95 <sup>12</sup>
19.3	39.671 <sup>100</sup>	23.97 <sup>66</sup>	61.420 <sup>101</sup>	24.96 <sup>67</sup>	5.459 <sup>202</sup>	69.13 <sup>20</sup>	53.717 <sup>109</sup>	53.59 <sup>36</sup>
29.2	39.571 <sup>100</sup>	24.57 <sup>60</sup>	61.318 <sup>102</sup>	25.55 <sup>59</sup>	5.250 <sup>209</sup>	68.89 <sup>24</sup>	53.605 <sup>112</sup>	53.02 <sup>57</sup>
July 9.2	39.475 <sup>96</sup>	25.08 <sup>51</sup>	61.219 <sup>99</sup>	26.04 <sup>49</sup>	5.041 <sup>209</sup>	68.23 <sup>66</sup>	53.493 <sup>112</sup>	52.25 <sup>77</sup>
	90	42	93	37	204	106	108	94
19.2	39.385	25.50	61.126	26.41	4.837	67.17	53.385	51.31
29.2	39.305 <sup>80</sup>	25.80 <sup>30</sup>	61.042 <sup>84</sup>	26.64 <sup>23</sup>	4.647 <sup>190</sup>	65.75 <sup>142</sup>	53.284 <sup>101</sup>	50.23 <sup>108</sup>
Aug. 8.1	39.239 <sup>66</sup>	25.95 <sup>15</sup>	60.971 <sup>71</sup>	26.73 <sup>9</sup>	4.478 <sup>169</sup>	63.98 <sup>177</sup>	53.195 <sup>89</sup>	49.03 <sup>120</sup>
	51	1	55	8	141	204	70	124
18.1	39.188 <sup>30</sup>	25.96 <sup>17</sup>	60.916 <sup>34</sup>	26.85 <sup>28</sup>	4.337 <sup>103</sup>	61.94 <sup>222</sup>	53.125 <sup>49</sup>	47.79 <sup>127</sup>
28.1	39.158 <sup>5</sup>	25.79 <sup>35</sup>	60.882 <sup>11</sup>	26.37 <sup>47</sup>	4.234 <sup>58</sup>	59.72 <sup>285</sup>	53.076 <sup>21</sup>	46.52 <sup>121</sup>
Sept. 7.0	39.153	25.44	60.871	25.90	4.176	57.37	53.055	45.31
17.0	39.178 <sup>25</sup>	24.88 <sup>56</sup>	60.891 <sup>20</sup>	25.21 <sup>69</sup>	4.171 <sup>5</sup>	54.99 <sup>238</sup>	53.068 <sup>13</sup>	44.19 <sup>112</sup>
27.0	39.236 <sup>58</sup>	24.09 <sup>79</sup>	60.944 <sup>53</sup>	24.30 <sup>91</sup>	4.225 <sup>54</sup>	52.68 <sup>231</sup>	53.119 <sup>51</sup>	43.23 <sup>96</sup>
Oct. 7.0	39.331 <sup>95</sup>	23.06 <sup>103</sup>	61.034 <sup>90</sup>	23.14 <sup>116</sup>	4.342 <sup>117</sup>	50.54 <sup>214</sup>	53.212 <sup>93</sup>	42.51 <sup>72</sup>
16.9	39.467 <sup>136</sup>	21.77 <sup>129</sup>	61.165 <sup>131</sup>	21.75 <sup>139</sup>	4.525 <sup>183</sup>	48.66 <sup>188</sup>	53.350 <sup>138</sup>	42.06 <sup>45</sup>
	176	151	172	163	247	152	184	10
26.9	39.643	20.26	61.337	20.12	4.772	47.14	53.534	41.96
Nov. 5.9	39.859 <sup>216</sup>	18.52 <sup>174</sup>	61.550 <sup>213</sup>	18.28 <sup>184</sup>	5.081 <sup>309</sup>	46.05 <sup>109</sup>	53.763 <sup>229</sup>	42.22 <sup>26</sup>
15.9	40.114 <sup>255</sup>	16.59 <sup>193</sup>	61.802 <sup>252</sup>	16.27 <sup>201</sup>	5.446 <sup>365</sup>	45.46 <sup>59</sup>	54.033 <sup>270</sup>	42.87 <sup>65</sup>
25.8	40.400 <sup>286</sup>	14.50 <sup>209</sup>	62.086 <sup>284</sup>	14.11 <sup>216</sup>	5.856 <sup>410</sup>	45.40 <sup>50</sup>	54.338 <sup>305</sup>	43.91 <sup>104</sup>
Dec. 5.8	40.713 <sup>313</sup>	12.32 <sup>213</sup>	62.398 <sup>312</sup>	11.89 <sup>222</sup>	6.300 <sup>444</sup>	45.90 <sup>50</sup>	54.670 <sup>332</sup>	45.30 <sup>139</sup>
	329	221	329	223	463	105	350	174
15.8	41.042	10.11	62.727	9.66	6.763	46.95	55.020	47.04
25.7	41.378 <sup>336</sup>	7.94 <sup>217</sup>	63.063 <sup>336</sup>	7.48 <sup>218</sup>	7.232 <sup>469</sup>	48.52 <sup>157</sup>	55.375 <sup>355</sup>	49.06 <sup>202</sup>
35.7	41.711 <sup>333</sup>	5.87 <sup>207</sup>	63.396 <sup>333</sup>	5.44 <sup>204</sup>	7.689 <sup>457</sup>	50.56 <sup>204</sup>	55.725 <sup>350</sup>	51.30 <sup>224</sup>
Mean Place	37.180	37.72	58.908	37.95	2.987	37.19	51.206	29.59
Sec $\delta$ , Tan $\delta$	1.008	+0.124	1.013	+0.162	1.564	-1.203	1.080	-0.407
$D_\alpha \alpha$ , $D_\omega \alpha$	+0.06	+0.01	+0.06	+0.01	+0.06	-0.08	+0.06	-0.08
$D_\psi \delta$ , $D_\omega \delta$	-0.4	0.0	-0.4	0.0	-0.4	0.0	-0.4	0.0



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	4 H. Draconis. Mag. 5.1		$\delta$ Crucis. Mag. 3.1		$\delta$ Ursæ Majoris. Mag. 3.4		$\gamma$ Corvi. Mag. 2.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 8	° ' " +78 3	h m 12 10	° ' " -58 17	h m 12 11	° ' " +57 28	h m 12 11	° ' " -17 4
	s	"	s	"	s	"	s	"
Jan. 0.7	22.32	71.91	45.128	5.58	21.183	72.89	33.234	54.01
10.7	23.48 <sup>116</sup>	71.72 <sup>19</sup>	45.653 <sup>525</sup>	7.74 <sup>216</sup>	21.698 <sup>515</sup>	72.09 <sup>80</sup>	33.573 <sup>339</sup>	56.31 <sup>230</sup>
20.7	24.58 <sup>110</sup>	72.20 <sup>45</sup>	46.142 <sup>489</sup>	10.34 <sup>260</sup>	22.189 <sup>491</sup>	71.90 <sup>19</sup>	33.892 <sup>319</sup>	58.66 <sup>235</sup>
30.6	25.59 <sup>101</sup>	73.30 <sup>110</sup>	46.585 <sup>443</sup>	13.28 <sup>294</sup>	22.641 <sup>452</sup>	72.30 <sup>40</sup>	34.182 <sup>290</sup>	61.00 <sup>234</sup>
Feb. 9.6	26.48 <sup>89</sup>	74.97 <sup>167</sup>	46.969 <sup>384</sup>	16.49 <sup>321</sup>	23.039 <sup>398</sup>	73.29 <sup>99</sup>	34.437 <sup>255</sup>	63.25 <sup>225</sup>
	74	217	321	339	332	149	214	212
19.6	27.22	77.14	47.290	19.88	23.371	74.78	34.651	65.37
Mar. 1.6	27.77 <sup>55</sup>	79.73 <sup>259</sup>	47.543 <sup>253</sup>	23.36 <sup>348</sup>	23.630 <sup>259</sup>	76.71 <sup>193</sup>	34.824 <sup>173</sup>	67.32 <sup>195</sup>
11.5	28.13 <sup>36</sup>	82.59 <sup>286</sup>	47.727 <sup>184</sup>	26.86 <sup>350</sup>	23.811 <sup>181</sup>	78.99 <sup>228</sup>	34.954 <sup>130</sup>	69.06 <sup>174</sup>
21.5	28.28 <sup>15</sup>	85.63 <sup>304</sup>	47.845 <sup>118</sup>	30.29 <sup>343</sup>	23.913 <sup>102</sup>	81.52 <sup>253</sup>	35.044 <sup>90</sup>	70.58 <sup>152</sup>
31.5	28.23 <sup>5</sup>	88.69 <sup>306</sup>	47.899 <sup>54</sup>	33.60 <sup>331</sup>	23.940 <sup>27</sup>	84.17 <sup>265</sup>	35.096 <sup>52</sup>	71.86 <sup>128</sup>
	25	300	7	310	45	267	19	105
Apr. 10.5	27.98	91.69	47.892	36.70	23.895	86.84	35.115	72.91
20.4	27.57 <sup>41</sup>	94.49 <sup>280</sup>	47.832 <sup>60</sup>	39.56 <sup>286</sup>	23.788 <sup>107</sup>	89.41 <sup>257</sup>	35.104 <sup>11</sup>	73.73 <sup>82</sup>
30.4	27.01 <sup>56</sup>	96.99 <sup>250</sup>	47.724 <sup>108</sup>	42.10 <sup>254</sup>	23.626 <sup>162</sup>	91.81 <sup>240</sup>	35.069 <sup>35</sup>	74.31 <sup>58</sup>
May 10.4	26.31 <sup>70</sup>	99.10 <sup>211</sup>	47.573 <sup>151</sup>	44.29 <sup>219</sup>	23.421 <sup>205</sup>	93.93 <sup>212</sup>	35.013 <sup>56</sup>	74.68 <sup>37</sup>
20.3	25.51 <sup>80</sup>	100.76 <sup>166</sup>	47.384 <sup>189</sup>	46.10 <sup>181</sup>	23.180 <sup>241</sup>	95.70 <sup>177</sup>	34.940 <sup>73</sup>	74.82 <sup>14</sup>
	87	116	220	137	266	139	85	5
30.3	24.64	101.92	47.164	47.47	22.914	97.09	34.855	74.77
June 9.3	23.73 <sup>91</sup>	102.54 <sup>62</sup>	46.919 <sup>245</sup>	48.42 <sup>95</sup>	22.633 <sup>281</sup>	98.03 <sup>94</sup>	34.760 <sup>95</sup>	74.54 <sup>23</sup>
19.3	22.79 <sup>94</sup>	102.61 <sup>7</sup>	46.656 <sup>263</sup>	48.87 <sup>45</sup>	22.345 <sup>288</sup>	98.51 <sup>48</sup>	34.658 <sup>102</sup>	74.12 <sup>42</sup>
29.2	21.87 <sup>92</sup>	102.11 <sup>50</sup>	46.381 <sup>275</sup>	48.85 <sup>2</sup>	22.058 <sup>287</sup>	98.51 <sup>0</sup>	34.553 <sup>105</sup>	73.54 <sup>58</sup>
July 9.2	20.98 <sup>89</sup>	101.09 <sup>102</sup>	46.105 <sup>276</sup>	48.38 <sup>47</sup>	21.780 <sup>278</sup>	98.04 <sup>47</sup>	34.447 <sup>106</sup>	72.81 <sup>73</sup>
	84	154	272	94	262	94	104	85
19.2	20.14	99.55	45.833	47.44	21.518	97.10	34.343	71.96
29.2	19.38 <sup>76</sup>	97.52 <sup>203</sup>	45.577 <sup>256</sup>	46.07 <sup>137</sup>	21.278 <sup>240</sup>	95.71 <sup>139</sup>	34.247 <sup>96</sup>	71.01 <sup>95</sup>
Aug. 8.1	18.70 <sup>68</sup>	95.05 <sup>247</sup>	45.345 <sup>232</sup>	44.31 <sup>176</sup>	21.067 <sup>211</sup>	93.90 <sup>181</sup>	34.161 <sup>86</sup>	69.99 <sup>102</sup>
18.1	18.12 <sup>58</sup>	92.21 <sup>284</sup>	45.148 <sup>197</sup>	42.22 <sup>209</sup>	20.891 <sup>176</sup>	91.70 <sup>220</sup>	34.091 <sup>70</sup>	68.94 <sup>105</sup>
28.1	17.67 <sup>45</sup>	89.02 <sup>319</sup>	44.999 <sup>149</sup>	39.87 <sup>235</sup>	20.756 <sup>135</sup>	89.15 <sup>255</sup>	34.042 <sup>49</sup>	67.91 <sup>103</sup>
	31	345	94	252	89	284	23	95
Sept. 7.0	17.36	85.57	44.905	37.35	20.667	86.31	34.019	66.96
17.0	17.18 <sup>18</sup>	81.92 <sup>365</sup>	44.874 <sup>31</sup>	34.73 <sup>262</sup>	20.631 <sup>36</sup>	83.21 <sup>310</sup>	34.027 <sup>8</sup>	66.11 <sup>85</sup>
27.0	17.15 <sup>3</sup>	78.15 <sup>377</sup>	44.916 <sup>42</sup>	32.15 <sup>258</sup>	20.652 <sup>21</sup>	79.91 <sup>330</sup>	34.071 <sup>44</sup>	65.45 <sup>66</sup>
Oct. 7.0	17.28 <sup>13</sup>	74.32 <sup>383</sup>	45.035 <sup>119</sup>	29.68 <sup>247</sup>	20.736 <sup>84</sup>	76.48 <sup>343</sup>	34.157 <sup>86</sup>	65.01 <sup>44</sup>
16.9	17.57 <sup>29</sup>	70.52 <sup>380</sup>	45.235 <sup>200</sup>	27.45 <sup>223</sup>	20.886 <sup>150</sup>	72.98 <sup>350</sup>	34.285 <sup>128</sup>	64.86 <sup>15</sup>
	45	370	278	190	217	350	173	16
26.9	18.02	66.82	45.513	25.55	21.103	69.48	34.458	65.02
Nov. 5.9	18.64 <sup>62</sup>	63.34 <sup>348</sup>	45.866 <sup>353</sup>	24.08 <sup>147</sup>	21.387 <sup>284</sup>	66.06 <sup>342</sup>	34.676 <sup>218</sup>	65.51 <sup>49</sup>
15.9	19.40 <sup>76</sup>	60.15 <sup>319</sup>	46.286 <sup>420</sup>	23.09 <sup>99</sup>	21.735 <sup>348</sup>	62.82 <sup>324</sup>	34.935 <sup>259</sup>	66.38 <sup>87</sup>
25.8	20.29 <sup>89</sup>	57.33 <sup>282</sup>	46.762 <sup>476</sup>	22.67 <sup>42</sup>	22.141 <sup>406</sup>	59.85 <sup>297</sup>	35.229 <sup>294</sup>	67.58 <sup>120</sup>
Dec. 5.8	21.30 <sup>101</sup>	54.99 <sup>234</sup>	47.278 <sup>516</sup>	22.82 <sup>15</sup>	22.596 <sup>455</sup>	57.22 <sup>263</sup>	35.550 <sup>321</sup>	69.11 <sup>153</sup>
	111	181	541	74	491	220	338	182
15.8	22.41	53.18	47.819	23.56	23.087	55.02	35.888	70.93
25.7	23.55 <sup>114</sup>	51.97 <sup>121</sup>	48.367 <sup>548</sup>	24.87 <sup>131</sup>	23.599 <sup>512</sup>	53.33 <sup>169</sup>	36.236 <sup>348</sup>	72.98 <sup>205</sup>
35.7	24.72 <sup>117</sup>	51.39 <sup>58</sup>	48.904 <sup>537</sup>	26.71 <sup>184</sup>	24.116 <sup>517</sup>	52.18 <sup>115</sup>	36.579 <sup>343</sup>	75.19 <sup>221</sup>
Mean Place	19.650	98.71	44.064	15.32	19.618	97.50	32.104	51.83
Sec $\delta$ , Tan $\delta$	4.838	+4.734	1.903	-1.619	1.861	+1.569	1.046	-0.307
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06	+0.32	+0.06	-0.11	+0.06	+0.10	+0.06	-0.02
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.4	0.0	-0.4	0.0	-0.4	0.0	-0.4	-0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	2 Canum Venat. Mag. 5.8		$\beta$ Chamæleontis. Mag. 4.4		$\gamma$ Virginis. Mag. 4.0		$\alpha^1$ Crucis. Mag. 1.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 11	" ' +41 6	h m 12 13	" ' -78 50	h m 12 15	" ' - 0 12	h m 12 21	" ' -62 38
	s 12 11	" +41 6	s 12 13	" -78 50	s 12 15	" - 0 12	s 12 21	" -62 38
Jan. 0.7	59.715	58.12	27.81	52.05	40.716	28.48	59.13	10.85
10.7	60.114	56.86	29.05	53.82	41.046	30.60	59.73	12.81
20.7	60.494	56.11	30.21	56.13	41.358	32.61	60.29	15.24
30.7	60.842	55.89	31.26	58.91	41.644	34.43	60.80	18.05
Feb. 9.6	61.150	56.18	32.15	62.09	41.896	36.01	61.25	21.19
19.6	61.409	56.96	32.90	65.58	42.109	37.33	61.62	24.55
Mar. 1.6	61.614	58.17	33.48	69.27	42.282	38.37	61.93	28.06
11.5	61.762	59.74	33.88	73.09	42.413	39.13	62.16	31.61
21.5	61.854	61.57	34.12	76.94	42.505	39.64	62.31	35.14
31.5	61.895	63.60	34.18	80.75	42.559	39.89	62.39	38.59
Apr. 10.5	61.886	65.73	34.08	84.44	42.580	39.93	62.40	41.87
20.4	61.834	67.83	33.83	87.91	42.573	39.79	62.35	44.92
30.4	61.746	69.87	33.42	91.13	42.540	39.48	62.24	47.69
May 10.4	61.628	71.73	32.89	94.01	42.488	39.07	62.08	50.12
20.4	61.488	73.36	32.24	96.47	42.420	38.56	61.86	52.16
30.3	61.332	74.71	31.49	98.49	42.341	37.98	61.62	53.79
June 9.3	61.164	75.73	30.65	100.04	42.252	37.37	61.34	54.96
19.3	60.991	76.40	29.76	101.04	42.157	36.73	61.03	55.66
29.2	60.820	76.70	28.83	101.50	42.059	36.09	60.70	55.86
July 9.2	60.655	76.63	27.89	101.41	41.961	35.47	60.37	55.57
19.2	60.496	76.17	26.97	100.77	41.866	34.88	60.04	54.80
29.2	60.352	75.34	26.10	99.60	41.776	34.35	59.73	53.56
Aug. 8.1	60.226	74.15	25.32	97.93	41.697	33.90	59.44	51.90
18.1	60.120	72.61	24.63	95.82	41.632	33.55	59.18	49.88
28.1	60.043	70.75	24.08	93.34	41.584	33.34	58.99	47.55
Sept. 7.1	59.996	68.60	23.71	90.57	41.563	33.28	58.86	44.98
17.0	59.987	66.18	23.51	87.61	41.569	33.40	58.79	42.30
27.0	60.020	63.53	23.51	84.58	41.608	33.75	58.81	39.59
Oct. 7.0	60.099	60.70	23.73	81.58	41.686	34.33	58.91	36.97
16.9	60.226	57.72	24.16	78.74	41.804	35.17	59.11	34.53
26.9	60.405	54.66	24.80	76.18	41.964	36.28	59.40	32.40
Nov. 5.9	60.634	51.61	25.60	74.01	42.168	37.65	59.78	30.66
15.9	60.912	48.60	26.61	72.32	42.411	39.28	60.23	29.40
25.8	61.233	45.72	27.75	71.19	42.687	41.11	60.75	28.69
Dec. 5.8	61.592	43.07	28.98	70.68	42.992	43.12	61.32	28.55
15.8	61.976	40.71	30.26	70.79	43.317	45.25	61.92	29.02
25.8	62.376	38.74	31.56	71.55	43.651	47.43	62.54	30.08
35.7	62.778	37.20	32.84	72.93	43.984	49.58	63.14	31.69
Mean Place	58.355	79.27	26.825	64.93	39.568	20.31	58.181	21.43
Sec $\delta$ , Tan $\delta$	1.327	+0.873	5.173	-5.075	1.000	-0.004	2.176	-1.933
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.06	+0.06	+0.07	-0.34	+0.06	0.00	+0.06	-0.13
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1



## 416      APPARENT PLACES OF STARS, 1917.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	20 Comae. Mag. 5.7		$\delta$ Corvi. Mag. 3.1		$\gamma$ Crucis. Mag. 1.6		8 Canum Venat. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 25	° ' " +21 20	h m 12 25	° ' " -16 3	h m 12 26	° ' " -56 38	h m 12 29	° ' " +41 47
	s	"	s	"	s	"	s	"
Jan. 0.7	34.365	64.53	35.120	15.13	33.971	44.91	49.531	68.22
10.7	34.711 <sup>346</sup>	62.71 <sup>182</sup>	35.461 <sup>341</sup>	17.37 <sup>224</sup>	34.490 <sup>519</sup>	46.90 <sup>199</sup>	49.933 <sup>402</sup>	66.83 <sup>139</sup>
20.7	35.043 <sup>332</sup>	61.26 <sup>145</sup>	35.786 <sup>325</sup>	19.65 <sup>228</sup>	34.979 <sup>489</sup>	49.34 <sup>244</sup>	50.321 <sup>388</sup>	65.96 <sup>87</sup>
30.7	35.349 <sup>306</sup>	60.19 <sup>107</sup>	36.083 <sup>297</sup>	21.92 <sup>227</sup>	35.426 <sup>447</sup>	52.12 <sup>278</sup>	50.680 <sup>359</sup>	65.62 <sup>34</sup>
Feb. 9.6	35.622 <sup>273</sup>	59.53 <sup>66</sup>	36.347 <sup>264</sup>	24.11 <sup>219</sup>	35.821 <sup>395</sup>	55.19 <sup>307</sup>	51.002 <sup>322</sup>	65.82 <sup>20</sup>
	234	25	227	204	337	326	276	71
19.6	35.856	59.28	36.574	26.15	36.158	58.45	51.278	66.53
Mar. 1.6	36.046	59.41	36.760	28.03	36.431	61.81	51.502	67.70
11.6	36.192 <sup>190</sup>	59.89 <sup>13</sup>	36.905 <sup>186</sup>	29.69 <sup>188</sup>	36.642 <sup>273</sup>	65.21 <sup>336</sup>	51.671 <sup>224</sup>	69.26 <sup>117</sup>
21.5	36.294 <sup>146</sup>	60.69 <sup>48</sup>	37.009 <sup>145</sup>	31.14 <sup>166</sup>	36.790 <sup>211</sup>	68.56 <sup>340</sup>	51.784 <sup>169</sup>	71.12 <sup>156</sup>
31.5	36.354 <sup>102</sup>	61.72 <sup>80</sup>	37.076 <sup>104</sup>	32.35 <sup>145</sup>	36.875 <sup>148</sup>	71.81 <sup>335</sup>	51.844 <sup>113</sup>	73.21 <sup>186</sup>
	23	122	34	99	29	305	10	220
Apr. 10.5	36.377	62.94	37.110	33.34	36.904	74.86	51.854	75.41
20.4	36.366	64.26	37.114	34.10	36.878	77.70	51.819	77.64
30.4	36.328	65.62	37.092	34.65	36.805	80.26	51.745	79.79
May 10.4	36.265	66.97	37.049	34.99	36.689	82.49	51.639	81.81
20.4	36.185	68.25	36.987	35.13	36.534	84.37	51.508	83.61
	95	115	77	5	186	147	152	151
30.3	36.090	69.40	36.910	35.08	36.348	85.84	51.356	85.12
June 9.3	35.984	70.41	36.821	34.85	36.132	86.88	51.189	86.32
19.3	35.871	71.24	36.724	34.47	35.895	87.47	51.014	87.17
29.3	35.754	71.85	36.621	33.93	35.643	87.60	50.835	87.64
July 9.2	35.639	72.25	36.514	33.25	35.382	87.27	50.657	87.72
	114	15	106	78	257	78	173	31
19.2	35.525	72.40	36.406	32.47	35.125	86.49	50.484	87.41
29.2	35.417	72.31	36.306	31.59	34.875	85.28	50.323	86.70
Aug. 8.1	35.320	71.97	36.213	30.65	34.644	83.69	50.175	85.62
18.1	35.237	71.37	36.133	29.69	34.444	81.76	50.048	84.18
28.1	35.175	70.52	36.073	28.74	34.283	79.55	49.944	82.39
	40	111	35	89	111	240	73	211
Sept. 7.1	35.135	69.41	36.038	27.85	34.172	77.15	49.871	80.28
17.0	35.126	68.05	36.032	27.09	34.120	74.64	49.835	77.89
27.0	35.151	66.43	36.062	26.49	34.136	72.11	49.840	75.25
Oct. 7.0	35.214	64.59	36.133	26.10	34.226	69.68	49.891	72.40
17.0	35.319	62.52	36.248	25.99	34.393	67.47	49.992	69.37
	150	205	159	19	246	192	153	311
26.9	35.469	60.27	36.407	26.18	34.639	65.55	50.145	66.26
Nov. 5.9	35.663	57.87	36.612	26.69	34.958	64.02	50.351	63.12
15.9	35.899	55.38	36.859	27.55	35.345	62.95	50.609	60.01
25.8	36.174	52.84	37.143	28.74	35.789	62.42	50.914	57.03
Dec. 5.8	36.482	50.33	37.457	30.23	36.279	62.45	51.258	54.25
	331	241	334	178	518	59	375	249
15.8	36.813	47.92	37.791	32.01	36.797	63.04	51.633	51.76
25.8	37.158	45.69	38.136	34.00	37.328	64.19	52.029	49.65
35.7	37.506	43.72	38.481	36.16	37.856	65.87	52.430	47.97
	345	223	345	199	531	115	396	211
	348	197	345	216	528	168	401	168
Mean Place	33.217	80.18	34.065	12.48	33.028	54.24	48.338	89.82
Sec $\delta$ , Tan $\delta$	1.074	+0.391	1.041	-0.288	1.819	-1.520	1.341	+0.894
$D\psi\alpha$ , $D_\omega\alpha$	+0.06	+0.03	+0.06	-0.02	+0.07	-0.10	+0.06	+0.06
$D\psi\delta$ , $D_\omega\delta$	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Draconis. Mag. 3.9		$\beta$ Corvi. Mag. 2.8		$\delta$ Comae seq. Mag. 5.2		$\alpha$ Muscae. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 29	° ' " +70 13	h m 12 30	° ' " -22 56	h m 12 30	° ' " +18 49	h m 12 32	° ' " -68 40
	s	"	s	"	s	"	s	"
Jan. 0.7	58.43	77.66	2.421	16.71	59.134	46.63	13.88	30.62
10.7	59.18	76.97	2.774	18.93	59.477	44.74	14.61	32.33
20.7	59.91	76.94	3.111	21.28	59.807	43.20	15.31	34.56
30.7	60.59	77.55	3.420	23.68	60.112	42.02	15.95	37.23
Feb. 9.6	61.20	78.77	3.696	26.07	60.385	41.22	16.51	40.27
19.6	61.72	80.54	3.933	28.38	60.621	40.83	17.00	43.59
Mar. 1.6	62.14	82.78	4.129	30.57	60.814	40.81	17.39	47.11
11.6	62.43	85.38	4.282	32.58	60.964	41.15	17.69	50.73
21.5	62.61	88.23	4.395	34.42	61.071	41.80	17.90	54.37
31.5	62.67	91.21	4.469	36.03	61.137	42.69	18.02	57.97
Apr. 10.5	62.60	94.20	4.510	37.42	61.167	43.77	18.06	61.44
20.4	62.42	97.08	4.518	38.57	61.164	44.99	18.00	64.72
30.4	62.16	99.74	4.499	39.50	61.132	46.26	17.87	67.74
May 10.4	61.81	102.10	4.457	40.18	61.078	47.54	17.67	70.44
20.4	61.39	104.07	4.395	40.63	61.004	48.77	17.41	72.78
30.3	60.92	105.59	4.316	40.84	60.915	49.89	17.09	74.70
June 9.3	60.41	106.62	4.224	40.83	60.815	50.90	16.72	76.16
19.3	59.89	107.13	4.121	40.59	60.707	51.75	16.32	77.13
29.3	59.36	107.10	4.010	40.15	60.595	52.40	15.89	77.58
July 9.2	58.83	106.55	3.896	39.50	60.481	52.86	15.44	77.52
19.2	58.33	105.48	3.781	38.68	60.369	53.09	15.00	76.95
29.2	57.85	103.92	3.669	37.71	60.262	53.11	14.57	75.88
Aug. 8.1	57.42	101.89	3.565	36.61	60.164	52.88	14.17	74.34
18.1	57.05	99.44	3.476	35.41	60.078	52.42	13.81	72.38
28.1	56.74	96.62	3.407	34.19	60.013	51.70	13.52	70.07
Sept. 7.1	56.50	93.47	3.363	32.99	59.970	50.74	13.30	67.48
17.0	56.35	90.05	3.351	31.86	59.956	49.53	13.18	64.72
27.0	56.29	86.45	3.377	30.87	59.976	48.07	13.17	61.87
Oct. 7.0	56.32	82.72	3.446	30.08	60.034	46.37	13.26	59.06
17.0	56.45	78.94	3.560	29.54	60.133	44.45	13.47	56.40
26.9	56.69	75.19	3.722	29.31	60.276	42.31	13.80	53.99
Nov. 5.9	57.04	71.56	3.931	29.43	60.463	40.01	14.23	51.96
15.9	57.48	68.16	4.184	29.91	60.694	37.60	14.77	50.38
25.8	58.02	65.06	4.477	30.77	60.964	35.13	15.39	49.33
Dec. 5.8	58.64	62.35	4.801	32.00	61.266	32.65	16.08	48.88
15.8	59.32	60.12	5.147	33.57	61.592	30.25	16.81	49.02
25.8	60.04	58.44	5.504	35.43	61.932	27.99	17.56	49.77
35.7	60.79	57.38	5.860	37.53	62.277	25.97	18.30	51.13
Mean Place	56.924	104.25	1.405	16.40	58.031	61.51	13.073	42.18
Sec $\delta$ , Tan $\delta$	2.958	+2.784	1.086	-0.423	1.057	+0.341	2.751	-2.562
$D\phi\alpha$ , $D_\omega\alpha$	+0.05	+0.18	+0.06	-0.03	+0.06	+0.02	+0.07	-0.17
$D\phi\delta$ , $D_\omega\delta$	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1	-0.4	-0.1

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\chi$ Virginis. Mag. 4.8		$\gamma$ Centauri. Mag. 2.4		$\gamma$ Virginis (mean). Mag. 2.9		$\rho$ Virginis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 34	° ' " — 7 32	h m 12 36	° ' " —48 30	h m 12 37	° ' " — 0 59	h m 12 37	° ' " +10 41
	s	"	s	"	s	"	s	"
Jan. 0.7	58.654	26.06	56.856	7.72	28.306	47.69	42.086	21.69
10.7	58.990 <sup>336</sup>	28.22 <sup>216</sup>	57.308 <sup>452</sup>	9.70 <sup>196</sup>	28.639 <sup>333</sup>	49.81 <sup>212</sup>	42.424 <sup>338</sup>	19.68 <sup>201</sup>
20.7	59.312 <sup>322</sup>	30.35 <sup>213</sup>	57.740 <sup>432</sup>	12.05 <sup>235</sup>	28.959 <sup>320</sup>	51.82 <sup>201</sup>	42.748 <sup>324</sup>	17.90 <sup>178</sup>
30.7	59.609 <sup>297</sup>	32.38 <sup>203</sup>	58.137 <sup>397</sup>	14.72 <sup>267</sup>	29.255 <sup>296</sup>	53.67 <sup>185</sup>	43.048 <sup>300</sup>	16.42 <sup>148</sup>
Feb. 9.6	59.875 <sup>266</sup>	34.24 <sup>186</sup>	58.492 <sup>355</sup>	17.60 <sup>288</sup>	29.520 <sup>265</sup>	55.28 <sup>161</sup>	43.318 <sup>270</sup>	15.26 <sup>116</sup>
	231	165	307	304	231	137	236	81
19.6	60.106	35.89	58.799	20.64	29.751	56.65	43.554	14.45
Mar. 1.6	60.297 <sup>191</sup>	37.32 <sup>143</sup>	59.053 <sup>254</sup>	23.73 <sup>309</sup>	29.942 <sup>191</sup>	57.73 <sup>108</sup>	43.749 <sup>195</sup>	13.97 <sup>48</sup>
11.6	60.448 <sup>151</sup>	38.50 <sup>118</sup>	59.254 <sup>201</sup>	26.83 <sup>310</sup>	30.094 <sup>152</sup>	58.53 <sup>80</sup>	43.903 <sup>154</sup>	13.83 <sup>14</sup>
21.5	60.560 <sup>112</sup>	39.44 <sup>94</sup>	59.402 <sup>148</sup>	29.85 <sup>302</sup>	30.206 <sup>112</sup>	59.07 <sup>54</sup>	44.016 <sup>113</sup>	14.00 <sup>17</sup>
31.5	60.636 <sup>76</sup>	40.12 <sup>68</sup>	59.499 <sup>97</sup>	32.76 <sup>291</sup>	30.282 <sup>76</sup>	59.35 <sup>28</sup>	44.091 <sup>75</sup>	14.41 <sup>41</sup>
	44	47	49	273	44	7	40	64
Apr. 10.5	60.680	40.59	59.548	35.49	30.326	59.42	44.131	15.05
20.4	60.693 <sup>13</sup>	40.85 <sup>26</sup>	59.554 <sup>6</sup>	37.99 <sup>250</sup>	30.338 <sup>12</sup>	59.30 <sup>12</sup>	44.140 <sup>9</sup>	15.83 <sup>78</sup>
30.4	60.678 <sup>15</sup>	40.93 <sup>8</sup>	59.519 <sup>35</sup>	40.23 <sup>224</sup>	30.324 <sup>14</sup>	59.01 <sup>29</sup>	44.121 <sup>19</sup>	16.73 <sup>90</sup>
May 10.4	60.643 <sup>35</sup>	40.84 <sup>9</sup>	59.448 <sup>71</sup>	42.17 <sup>194</sup>	30.289 <sup>35</sup>	58.60 <sup>41</sup>	44.080 <sup>41</sup>	17.68 <sup>95</sup>
20.4	60.590 <sup>53</sup>	40.61 <sup>23</sup>	59.344 <sup>104</sup>	43.77 <sup>160</sup>	30.234 <sup>55</sup>	58.09 <sup>51</sup>	44.020 <sup>60</sup>	18.65 <sup>97</sup>
	70	35	131	124	70	58	76	96
30.3	60.520	40.26	59.213	45.01	30.164	57.51	43.944	19.60
June 9.3	60.439 <sup>81</sup>	39.81 <sup>45</sup>	59.058 <sup>155</sup>	45.87 <sup>86</sup>	30.083 <sup>81</sup>	56.89 <sup>62</sup>	43.856 <sup>88</sup>	20.49 <sup>89</sup>
19.3	60.349 <sup>90</sup>	39.28 <sup>53</sup>	58.884 <sup>174</sup>	46.34 <sup>47</sup>	29.993 <sup>90</sup>	56.25 <sup>64</sup>	43.760 <sup>96</sup>	21.30 <sup>81</sup>
29.3	60.252 <sup>97</sup>	38.68 <sup>60</sup>	58.695 <sup>189</sup>	46.39 <sup>5</sup>	29.896 <sup>97</sup>	55.60 <sup>65</sup>	43.658 <sup>102</sup>	21.98 <sup>68</sup>
July 9.2	60.150 <sup>102</sup>	38.03 <sup>65</sup>	58.497 <sup>198</sup>	46.03 <sup>36</sup>	29.795 <sup>101</sup>	54.97 <sup>63</sup>	43.552 <sup>106</sup>	22.55 <sup>57</sup>
	102	67	200	75	102	60	105	42
19.2	60.048	37.36	58.297	45.28	29.693	54.37	43.447	22.97
29.2	59.949 <sup>99</sup>	36.67 <sup>69</sup>	58.102 <sup>195</sup>	44.16 <sup>112</sup>	29.594 <sup>99</sup>	53.82 <sup>55</sup>	43.345 <sup>102</sup>	23.22 <sup>25</sup>
Aug. 8.1	59.857 <sup>92</sup>	35.99 <sup>68</sup>	57.919 <sup>183</sup>	42.70 <sup>146</sup>	29.502 <sup>92</sup>	53.35 <sup>47</sup>	43.251 <sup>94</sup>	23.31 <sup>9</sup>
18.1	59.777 <sup>80</sup>	35.36 <sup>63</sup>	57.757 <sup>162</sup>	40.94 <sup>176</sup>	29.420 <sup>82</sup>	52.98 <sup>37</sup>	43.168 <sup>83</sup>	23.21 <sup>10</sup>
28.1	59.715 <sup>62</sup>	34.81 <sup>55</sup>	57.625 <sup>132</sup>	38.96 <sup>198</sup>	29.356 <sup>64</sup>	52.73 <sup>25</sup>	43.102 <sup>66</sup>	22.90 <sup>31</sup>
	41	45	95	215	43	11	44	52
Sept. 7.1	59.674	34.36	57.530	36.81	29.313	52.62	43.058	22.38
17.0	59.662 <sup>12</sup>	34.08 <sup>28</sup>	57.484 <sup>46</sup>	34.58 <sup>223</sup>	29.297 <sup>16</sup>	52.69 <sup>7</sup>	43.041 <sup>17</sup>	21.63 <sup>75</sup>
27.0	59.683 <sup>21</sup>	33.97 <sup>11</sup>	57.491 <sup>7</sup>	32.36 <sup>222</sup>	29.314 <sup>17</sup>	52.98 <sup>29</sup>	43.056 <sup>15</sup>	20.65 <sup>98</sup>
Oct. 7.0	59.743 <sup>60</sup>	34.09 <sup>12</sup>	57.559 <sup>68</sup>	30.25 <sup>211</sup>	29.370 <sup>56</sup>	53.50 <sup>52</sup>	43.109 <sup>53</sup>	19.42 <sup>123</sup>
17.0	59.844 <sup>101</sup>	34.47 <sup>38</sup>	57.692 <sup>133</sup>	28.34 <sup>191</sup>	29.465 <sup>95</sup>	54.28 <sup>78</sup>	43.201 <sup>92</sup>	17.95 <sup>147</sup>
	145	66	199	162	138	102	137	170
26.9	59.989	35.13	57.891	26.72	29.603	55.30	43.338	16.25
Nov. 5.9	60.177 <sup>188</sup>	36.07 <sup>94</sup>	58.154 <sup>263</sup>	25.47 <sup>125</sup>	29.786 <sup>183</sup>	56.60 <sup>130</sup>	43.519 <sup>181</sup>	14.34 <sup>191</sup>
15.9	60.409 <sup>232</sup>	37.30 <sup>123</sup>	58.477 <sup>323</sup>	24.67 <sup>80</sup>	30.011 <sup>225</sup>	58.15 <sup>155</sup>	43.742 <sup>223</sup>	12.24 <sup>210</sup>
25.8	60.679 <sup>270</sup>	38.81 <sup>151</sup>	58.851 <sup>374</sup>	24.35 <sup>32</sup>	30.274 <sup>263</sup>	59.92 <sup>177</sup>	44.004 <sup>262</sup>	10.02 <sup>222</sup>
Dec. 5.8	60.980 <sup>301</sup>	40.56 <sup>175</sup>	59.266 <sup>415</sup>	24.55 <sup>20</sup>	30.569 <sup>295</sup>	61.87 <sup>195</sup>	44.298 <sup>294</sup>	7.73 <sup>229</sup>
	322	194	444	72	317	210	318	231
15.8	61.302	42.50	59.710	25.27	30.886	63.97	44.616	5.42
25.8	61.637 <sup>335</sup>	44.58 <sup>208</sup>	60.168 <sup>458</sup>	26.50 <sup>123</sup>	31.216 <sup>330</sup>	66.11 <sup>214</sup>	44.949 <sup>333</sup>	3.17 <sup>225</sup>
35.7	61.975 <sup>338</sup>	46.72 <sup>214</sup>	60.626 <sup>458</sup>	28.20 <sup>170</sup>	31.550 <sup>334</sup>	68.25 <sup>214</sup>	45.285 <sup>336</sup>	1.06 <sup>211</sup>
Mean Place	57.636	20.34	55.952	15.08	27.290	39.62	41.049	33.89
Sec $\delta$ , Tan $\delta$	1.009	-0.132	1.509	-1.131	1.000	-0.017	1.018	+0.189
$D\alpha$ , $D\omega$	+0.06	-0.01	+0.07	-0.07	+0.06	0.00	+0.07	+0.01
$D\delta$ , $D\omega$	-0.4	-0.2	-0.4	-0.2	-0.4	-0.2	-0.4	-0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	76 Ursæ Majoris. Mag. 5.9		$\beta$ Crucis. Mag. 1.5		31 Comæ. Mag. 5.1		$\eta$ Centauri. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 37	° ' " +63 9	h m 12 42	° ' " -59 13	h m 12 47	° ' " +27 58	h m 12 48	° ' " -39 43
	s	"	s	"	s	"	s	"
Jan. 0.8	57.89	41.04	52.445	57.35	40.405	73.63	50.925	34.90
10.7	58.48	40.07	53.004	59.09	40.765	71.82	51.335	36.87
20.7	59.06	39.73	53.537	61.30	41.113	70.40	51.727	39.13
30.7	59.60	40.03	54.031	63.91	41.442	69.44	52.092	41.64
Feb. 9.6	60.08	40.95	54.475	66.82	41.740	68.94	52.423	44.30
19.6	60.50	42.42	54.860	69.97	42.000	68.91	52.712	47.04
Mar. 1.6	60.84	44.39	55.180	73.27	42.217	69.32	52.956	49.81
11.6	61.09	46.75	55.436	76.65	42.390	70.12	53.153	52.53
21.5	61.26	49.41	55.624	80.02	42.517	71.26	53.305	55.15
31.5	61.34	52.23	55.748	83.33	42.600	72.66	53.412	57.64
Apr. 10.5	61.31	55.11	55.810	86.50	42.644	74.26	53.478	59.94
20.5	61.22	57.93	55.814	89.46	42.649	75.96	53.507	62.02
30.4	61.06	60.59	55.762	92.19	42.622	77.70	53.501	63.87
May 10.4	60.83	63.00	55.661	94.60	42.568	79.40	53.463	65.43
20.4	60.55	65.06	55.515	96.67	42.489	80.99	53.397	66.71
30.3	60.24	66.72	55.330	98.36	42.392	82.43	53.307	67.68
June 9.3	59.89	67.92	55.109	99.62	42.279	83.67	53.194	68.32
19.3	59.53	68.65	54.859	100.44	42.157	84.67	53.064	68.62
29.3	59.16	68.88	54.588	100.80	42.027	85.39	52.919	68.59
July 9.2	58.79	68.59	54.304	100.69	41.892	85.84	52.764	68.21
19.2	58.43	67.80	54.016	100.11	41.758	85.98	52.605	67.51
29.2	58.09	66.52	53.732	99.08	41.628	85.81	52.446	66.51
Aug. 8.2	57.78	64.79	53.466	97.64	41.506	85.34	52.295	65.23
18.1	57.50	62.62	53.226	95.82	41.397	84.55	52.158	63.72
28.1	57.27	60.06	53.026	93.68	41.306	83.46	52.044	62.02
Sept. 7.1	57.09	57.18	52.877	91.31	41.239	82.08	51.960	60.21
17.0	56.97	53.99	52.790	88.78	41.200	80.40	51.914	58.35
27.0	56.92	50.58	52.774	86.20	41.195	78.47	51.914	56.52
Oct. 7.0	56.94	46.99	52.838	83.66	41.230	76.28	51.965	54.82
17.0	57.04	43.31	52.985	81.28	41.309	73.89	52.072	53.30
26.9	57.22	39.63	53.217	79.17	41.434	71.31	52.237	52.08
Nov. 5.9	57.48	36.01	53.532	77.42	41.607	68.60	52.459	51.19
15.9	57.82	32.56	53.921	76.09	41.827	65.82	52.735	50.70
25.9	58.24	29.36	54.376	75.27	42.091	63.04	53.060	50.67
Dec. 5.8	58.72	26.50	54.884	75.00	42.392	60.32	53.424	51.10
15.8	59.25	24.08	55.429	75.30	42.722	57.77	53.816	51.99
25.8	59.82	22.18	55.992	76.17	43.072	55.44	54.224	53.32
35.7	60.41	20.85	56.556	77.59	43.429	53.42	54.635	55.05
Mean Place	56.652	66.88	51.646	67.14	39.407	91.52	50.062	39.77
Sec $\delta$ , Tan $\delta$	2.215	+1.976	1.955	-1.680	1.132	+0.531	1.300	-0.831
$D\psi a$ , $D_{\omega} a$	+0.05	+0.13	+0.07	-0.11	+0.06	+0.03	+0.07	-0.05
$D\psi \delta$ , $D_{\omega} \delta$	-0.4	-0.2	-0.4	-0.2	-0.4	-0.2	-0.4	-0.2



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Virginis. Mag. 3.0		$\theta$ Virginis. Mag. 4.4		43 Comae. Mag. 4.3		20 Canum Venat. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 12 58	° ' +11 23	h m 13 5	° ' - 5 5	h m 13 8	° ' +28 17	h m 13 13	° ' +40 50
	s "	"	s "	"	s "	"	s "	"
Jan. 0.8	3.623	65.41	39.882	53.04	0.960	37.03	50.216	72.15
10.7	3.961 <sup>338</sup>	63.36 <sup>205</sup>	40.220 <sup>338</sup>	55.13 <sup>209</sup>	1.318 <sup>358</sup>	35.12 <sup>191</sup>	50.611 <sup>395</sup>	70.33 <sup>182</sup>
20.7	4.289 <sup>328</sup>	61.55 <sup>181</sup>	40.549 <sup>329</sup>	57.17 <sup>204</sup>	1.668 <sup>350</sup>	33.62 <sup>150</sup>	51.002 <sup>391</sup>	69.03 <sup>130</sup>
30.7	4.597 <sup>308</sup>	60.04 <sup>151</sup>	40.858 <sup>309</sup>	59.09 <sup>192</sup>	2.003 <sup>335</sup>	32.57 <sup>105</sup>	51.378 <sup>376</sup>	68.28 <sup>75</sup>
Feb. 9.7	4.880 <sup>283</sup>	58.87 <sup>117</sup>	41.143 <sup>285</sup>	60.82 <sup>178</sup>	2.310 <sup>307</sup>	31.99 <sup>58</sup>	51.726 <sup>348</sup>	68.09 <sup>19</sup>
19.6	5.129 <sup>249</sup>	58.05 <sup>82</sup>	41.395 <sup>252</sup>	62.34 <sup>152</sup>	2.583 <sup>273</sup>	31.90 <sup>9</sup>	52.036 <sup>310</sup>	68.44 <sup>35</sup>
Mar. 1.6	5.340 <sup>211</sup>	57.59 <sup>46</sup>	41.612 <sup>217</sup>	63.61 <sup>127</sup>	2.818 <sup>235</sup>	32.27 <sup>37</sup>	52.304 <sup>268</sup>	69.31 <sup>87</sup>
11.6	5.512 <sup>172</sup>	57.48 <sup>11</sup>	41.791 <sup>179</sup>	64.63 <sup>102</sup>	3.009 <sup>191</sup>	33.05 <sup>78</sup>	52.522 <sup>218</sup>	70.65 <sup>134</sup>
21.6	5.644 <sup>132</sup>	57.68 <sup>30</sup>	41.934 <sup>143</sup>	65.38 <sup>75</sup>	3.156 <sup>147</sup>	34.20 <sup>115</sup>	52.690 <sup>168</sup>	72.37 <sup>172</sup>
31.5	5.740 <sup>96</sup>	58.15 <sup>47</sup>	42.041 <sup>107</sup>	65.89 <sup>51</sup>	3.259 <sup>103</sup>	35.64 <sup>144</sup>	52.807 <sup>117</sup>	74.39 <sup>202</sup>
Apr. 10.5	5.799 <sup>59</sup>	58.87 <sup>72</sup>	42.114 <sup>73</sup>	66.17 <sup>28</sup>	3.322 <sup>63</sup>	37.31 <sup>167</sup>	52.873 <sup>66</sup>	76.61 <sup>222</sup>
20.5	5.826 <sup>27</sup>	59.74 <sup>87</sup>	42.157 <sup>43</sup>	66.25 <sup>8</sup>	3.347 <sup>25</sup>	39.11 <sup>180</sup>	52.894 <sup>21</sup>	78.94 <sup>233</sup>
30.4	5.826 <sup>0</sup>	60.72 <sup>98</sup>	42.172 <sup>15</sup>	66.16 <sup>9</sup>	3.339 <sup>8</sup>	40.96 <sup>185</sup>	52.873 <sup>51</sup>	81.28 <sup>234</sup>
May 10.4	5.800 <sup>26</sup>	61.77 <sup>105</sup>	42.163 <sup>9</sup>	65.91 <sup>25</sup>	3.300 <sup>39</sup>	42.79 <sup>183</sup>	52.814 <sup>29</sup>	83.55 <sup>227</sup>
20.4	5.753 <sup>47</sup>	62.84 <sup>107</sup>	42.131 <sup>32</sup>	65.56 <sup>35</sup>	3.235 <sup>65</sup>	44.54 <sup>175</sup>	52.723 <sup>91</sup>	85.65 <sup>210</sup>
30.4	5.687 <sup>66</sup>	63.88 <sup>104</sup>	42.082 <sup>49</sup>	65.11 <sup>45</sup>	3.148 <sup>87</sup>	46.14 <sup>160</sup>	52.604 <sup>119</sup>	87.54 <sup>189</sup>
June 9.3	5.607 <sup>80</sup>	64.86 <sup>96</sup>	42.015 <sup>67</sup>	64.59 <sup>52</sup>	3.044 <sup>104</sup>	47.55 <sup>141</sup>	52.463 <sup>141</sup>	89.14 <sup>160</sup>
19.3	5.515 <sup>92</sup>	65.75 <sup>89</sup>	41.935 <sup>80</sup>	64.01 <sup>58</sup>	2.924 <sup>120</sup>	48.71 <sup>116</sup>	52.303 <sup>160</sup>	90.40 <sup>126</sup>
29.3	5.414 <sup>101</sup>	66.52 <sup>77</sup>	41.844 <sup>91</sup>	63.40 <sup>61</sup>	2.793 <sup>131</sup>	49.61 <sup>90</sup>	52.131 <sup>172</sup>	91.30 <sup>90</sup>
July 9.3	5.306 <sup>108</sup>	67.15 <sup>63</sup>	41.744 <sup>100</sup>	62.77 <sup>63</sup>	2.655 <sup>138</sup>	50.22 <sup>61</sup>	51.951 <sup>180</sup>	91.81 <sup>51</sup>
19.2	5.194 <sup>112</sup>	67.62 <sup>47</sup>	41.638 <sup>106</sup>	62.15 <sup>62</sup>	2.514 <sup>141</sup>	50.52 <sup>30</sup>	51.766 <sup>185</sup>	91.92 <sup>11</sup>
29.2	5.083 <sup>111</sup>	67.91 <sup>29</sup>	41.530 <sup>108</sup>	61.54 <sup>61</sup>	2.372 <sup>142</sup>	50.51 <sup>1</sup>	51.581 <sup>185</sup>	91.63 <sup>29</sup>
Aug. 8.2	4.977 <sup>106</sup>	68.03 <sup>12</sup>	41.425 <sup>105</sup>	60.96 <sup>58</sup>	2.235 <sup>137</sup>	50.17 <sup>34</sup>	51.404 <sup>177</sup>	90.92 <sup>71</sup>
18.1	4.879 <sup>96</sup>	67.95 <sup>8</sup>	41.327 <sup>98</sup>	60.45 <sup>51</sup>	2.108 <sup>127</sup>	49.51 <sup>66</sup>	51.239 <sup>165</sup>	89.82 <sup>110</sup>
28.1	4.795 <sup>84</sup>	67.65 <sup>30</sup>	41.241 <sup>86</sup>	60.03 <sup>42</sup>	1.997 <sup>111</sup>	48.54 <sup>97</sup>	51.091 <sup>148</sup>	88.34 <sup>148</sup>
Sept. 7.1	4.732 <sup>63</sup>	67.14 <sup>51</sup>	41.176 <sup>65</sup>	59.73 <sup>30</sup>	1.905 <sup>92</sup>	47.24 <sup>130</sup>	50.968 <sup>123</sup>	86.50 <sup>184</sup>
17.1	4.694 <sup>38</sup>	66.38 <sup>76</sup>	41.135 <sup>41</sup>	59.58 <sup>15</sup>	1.842 <sup>63</sup>	45.65 <sup>159</sup>	50.876 <sup>92</sup>	84.32 <sup>218</sup>
27.0	4.687 <sup>7</sup>	65.39 <sup>99</sup>	41.126 <sup>9</sup>	59.60 <sup>2</sup>	1.813 <sup>29</sup>	43.78 <sup>187</sup>	50.821 <sup>55</sup>	81.84 <sup>248</sup>
Oct. 7.0	4.717 <sup>30</sup>	64.14 <sup>125</sup>	41.154 <sup>28</sup>	59.85 <sup>25</sup>	1.822 <sup>9</sup>	41.64 <sup>214</sup>	50.811 <sup>10</sup>	79.10 <sup>274</sup>
17.0	4.788 <sup>71</sup>	62.66 <sup>148</sup>	41.223 <sup>69</sup>	60.33 <sup>48</sup>	1.874 <sup>52</sup>	39.27 <sup>237</sup>	50.850 <sup>39</sup>	76.13 <sup>297</sup>
26.9	4.904 <sup>116</sup>	60.94 <sup>172</sup>	41.338 <sup>115</sup>	61.08 <sup>75</sup>	1.974 <sup>100</sup>	36.70 <sup>257</sup>	50.944 <sup>94</sup>	73.00 <sup>313</sup>
Nov. 5.9	5.065 <sup>161</sup>	59.01 <sup>193</sup>	41.499 <sup>161</sup>	62.09 <sup>101</sup>	2.124 <sup>150</sup>	33.99 <sup>271</sup>	51.091 <sup>147</sup>	69.77 <sup>323</sup>
15.9	5.270 <sup>205</sup>	56.88 <sup>213</sup>	41.704 <sup>205</sup>	63.38 <sup>129</sup>	2.322 <sup>198</sup>	31.18 <sup>281</sup>	51.294 <sup>203</sup>	66.51 <sup>326</sup>
25.9	5.516 <sup>246</sup>	54.63 <sup>226</sup>	41.951 <sup>247</sup>	64.92 <sup>154</sup>	2.566 <sup>244</sup>	28.35 <sup>283</sup>	51.550 <sup>256</sup>	63.32 <sup>319</sup>
Dec. 5.8	5.797 <sup>281</sup>	52.30 <sup>233</sup>	42.232 <sup>281</sup>	66.66 <sup>174</sup>	2.849 <sup>283</sup>	25.58 <sup>277</sup>	51.853 <sup>303</sup>	60.28 <sup>304</sup>
15.8	6.107 <sup>310</sup>	49.96 <sup>284</sup>	42.542 <sup>310</sup>	68.58 <sup>192</sup>	3.167 <sup>318</sup>	22.95 <sup>263</sup>	52.196 <sup>343</sup>	57.46 <sup>282</sup>
25.8	6.433 <sup>326</sup>	47.68 <sup>228</sup>	42.869 <sup>327</sup>	70.61 <sup>203</sup>	3.507 <sup>340</sup>	20.53 <sup>242</sup>	52.566 <sup>370</sup>	54.98 <sup>248</sup>
35.8	6.768 <sup>335</sup>	45.53 <sup>215</sup>	43.204 <sup>335</sup>	72.70 <sup>209</sup>	3.860 <sup>353</sup>	18.42 <sup>211</sup>	52.956 <sup>390</sup>	52.90 <sup>208</sup>
Mean Place	2.714	77.96	39.035	46.26	0.119	55.05	49.448	93.61
Sec $\delta$ , Tan $\delta$	1.020	+0.202	1.004	-0.089	1.136	+0.538	1.325	+0.869
D $\phi$ $\alpha$ , D $\omega$ $\alpha$	+0.06	+0.01	+0.06	-0.01	+0.06	+0.03	+0.05	+0.08
D $\phi$ $\delta$ , D $\omega$ $\delta$	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Hydre. Mag. 3.3		$\epsilon$ Centauri. Mag. 2.9		$\zeta^1$ Ursæ Majoris. (Mizar.) Mag. 2.4		$\alpha$ Virginis. (Spica.) Mag. 1.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 14	" ' " " " " -22 44	h m 13 15	" ' " " " " -36 16	h m 13 20	" ' " " " " +55 20	h m 13 20	" ' " " " " -10 43
Jan. 0.8	25.109 <sup>360</sup>	2.90 <sup>194</sup>	56.183 <sup>398</sup>	25.81 <sup>175</sup>	35.856 <sup>483</sup>	66.18 <sup>164</sup>	49.845 <sup>343</sup>	47.05 <sup>202</sup>
10.7	25.469 <sup>351</sup>	4.84 <sup>209</sup>	56.581 <sup>390</sup>	27.56 <sup>204</sup>	36.339 <sup>484</sup>	64.54 <sup>105</sup>	50.188 <sup>336</sup>	49.07 <sup>204</sup>
20.7	25.820 <sup>334</sup>	6.93 <sup>216</sup>	56.971 <sup>369</sup>	29.60 <sup>224</sup>	36.823 <sup>468</sup>	63.49 <sup>42</sup>	50.524 <sup>319</sup>	51.11 <sup>198</sup>
30.7	26.154 <sup>306</sup>	9.09 <sup>217</sup>	57.340 <sup>339</sup>	31.84 <sup>239</sup>	37.291 <sup>437</sup>	63.07 <sup>21</sup>	50.843 <sup>295</sup>	53.09 <sup>186</sup>
Feb. 9.7	26.460 <sup>275</sup>	11.26 <sup>210</sup>	57.679 <sup>304</sup>	34.23 <sup>247</sup>	37.728 <sup>393</sup>	63.28 <sup>82</sup>	51.138 <sup>266</sup>	54.95 <sup>169</sup>
19.6	26.735 <sup>238</sup>	13.36 <sup>202</sup>	57.983 <sup>265</sup>	36.70 <sup>249</sup>	38.121 <sup>339</sup>	64.10 <sup>138</sup>	51.404 <sup>232</sup>	56.64 <sup>150</sup>
Mar. 1.6	26.973 <sup>200</sup>	15.38 <sup>188</sup>	58.248 <sup>223</sup>	39.19 <sup>246</sup>	38.460 <sup>276</sup>	65.48 <sup>186</sup>	51.636 <sup>196</sup>	58.14 <sup>129</sup>
11.6	27.173 <sup>163</sup>	17.26 <sup>171</sup>	58.471 <sup>180</sup>	41.65 <sup>237</sup>	38.736 <sup>211</sup>	67.34 <sup>226</sup>	51.832 <sup>159</sup>	59.43 <sup>104</sup>
21.6	27.336 <sup>124</sup>	18.97 <sup>153</sup>	58.651 <sup>140</sup>	44.02 <sup>225</sup>	38.947 <sup>140</sup>	69.60 <sup>256</sup>	51.991 <sup>124</sup>	60.47 <sup>83</sup>
31.5	27.460 <sup>91</sup>	20.50 <sup>134</sup>	58.791 <sup>100</sup>	46.27 <sup>208</sup>	39.087 <sup>74</sup>	72.16 <sup>273</sup>	52.115 <sup>92</sup>	61.30 <sup>59</sup>
Apr. 10.5	27.551 <sup>58</sup>	21.84 <sup>112</sup>	58.891 <sup>64</sup>	48.35 <sup>190</sup>	39.161 <sup>10</sup>	74.89 <sup>251</sup>	52.207 <sup>60</sup>	61.89 <sup>41</sup>
20.5	27.609 <sup>27</sup>	22.96 <sup>93</sup>	58.955 <sup>28</sup>	50.25 <sup>168</sup>	39.171 <sup>51</sup>	77.70 <sup>277</sup>	52.267 <sup>31</sup>	62.30 <sup>21</sup>
30.4	27.636 <sup>2</sup>	23.89 <sup>72</sup>	58.983 <sup>3</sup>	51.93 <sup>146</sup>	39.120 <sup>104</sup>	80.47 <sup>262</sup>	52.298 <sup>7</sup>	62.51 <sup>5</sup>
May 10.4	27.638 <sup>24</sup>	24.61 <sup>52</sup>	58.980 <sup>33</sup>	53.39 <sup>120</sup>	39.016 <sup>151</sup>	83.09 <sup>241</sup>	52.305 <sup>18</sup>	62.56 <sup>9</sup>
20.4	27.614 <sup>46</sup>	25.13 <sup>31</sup>	58.947 <sup>60</sup>	54.59 <sup>95</sup>	38.865 <sup>191</sup>	85.50 <sup>210</sup>	52.287 <sup>38</sup>	62.47 <sup>23</sup>
30.4	27.568 <sup>67</sup>	25.44 <sup>12</sup>	58.887 <sup>84</sup>	55.54 <sup>65</sup>	38.674 <sup>225</sup>	87.60 <sup>173</sup>	52.249 <sup>57</sup>	62.24 <sup>33</sup>
June 9.3	27.501 <sup>83</sup>	25.56 <sup>7</sup>	58.803 <sup>105</sup>	56.19 <sup>37</sup>	38.449 <sup>251</sup>	89.33 <sup>131</sup>	52.192 <sup>75</sup>	61.91 <sup>42</sup>
19.3	27.418 <sup>99</sup>	25.49 <sup>27</sup>	58.698 <sup>125</sup>	56.56 <sup>8</sup>	38.198 <sup>268</sup>	90.64 <sup>87</sup>	52.117 <sup>88</sup>	61.49 <sup>50</sup>
29.3	27.319 <sup>111</sup>	25.22 <sup>44</sup>	58.573 <sup>139</sup>	56.64 <sup>22</sup>	37.930 <sup>279</sup>	91.51 <sup>39</sup>	52.029 <sup>100</sup>	60.99 <sup>57</sup>
July 9.3	27.208 <sup>120</sup>	24.78 <sup>61</sup>	58.434 <sup>149</sup>	56.42 <sup>51</sup>	37.651 <sup>285</sup>	91.90 <sup>9</sup>	51.929 <sup>109</sup>	60.42 <sup>62</sup>
19.2	27.088 <sup>123</sup>	24.17 <sup>77</sup>	58.285 <sup>154</sup>	55.91 <sup>79</sup>	37.366 <sup>283</sup>	91.81 <sup>57</sup>	51.820 <sup>113</sup>	59.80 <sup>66</sup>
29.2	26.965 <sup>123</sup>	23.40 <sup>89</sup>	58.131 <sup>153</sup>	55.12 <sup>104</sup>	37.083 <sup>272</sup>	91.24 <sup>105</sup>	51.707 <sup>113</sup>	59.14 <sup>67</sup>
Aug. 8.2	26.842 <sup>115</sup>	22.51 <sup>99</sup>	57.978 <sup>144</sup>	54.08 <sup>127</sup>	36.811 <sup>254</sup>	90.19 <sup>150</sup>	51.594 <sup>108</sup>	58.47 <sup>66</sup>
18.1	26.727 <sup>102</sup>	21.52 <sup>106</sup>	57.834 <sup>127</sup>	52.81 <sup>144</sup>	36.557 <sup>231</sup>	88.69 <sup>193</sup>	51.486 <sup>97</sup>	57.81 <sup>63</sup>
28.1	26.635 <sup>81</sup>	20.46 <sup>107</sup>	57.707 <sup>104</sup>	51.37 <sup>156</sup>	36.326 <sup>196</sup>	86.76 <sup>232</sup>	51.389 <sup>79</sup>	57.18 <sup>55</sup>
Sept. 7.1	26.544 <sup>54</sup>	19.39 <sup>104</sup>	57.603 <sup>70</sup>	49.81 <sup>163</sup>	36.130 <sup>155</sup>	84.44 <sup>270</sup>	51.310 <sup>55</sup>	56.63 <sup>44</sup>
17.1	26.490 <sup>19</sup>	18.35 <sup>95</sup>	57.533 <sup>30</sup>	48.18 <sup>162</sup>	35.975 <sup>107</sup>	81.74 <sup>300</sup>	51.255 <sup>23</sup>	56.19 <sup>29</sup>
27.0	26.471 <sup>21</sup>	17.40 <sup>81</sup>	57.503 <sup>17</sup>	46.56 <sup>153</sup>	35.868 <sup>50</sup>	78.74 <sup>325</sup>	51.232 <sup>14</sup>	55.90 <sup>11</sup>
Oct. 7.0	26.492 <sup>68</sup>	16.59 <sup>60</sup>	57.520 <sup>71</sup>	45.03 <sup>138</sup>	35.818 <sup>12</sup>	75.49 <sup>346</sup>	51.246 <sup>56</sup>	55.79 <sup>12</sup>
17.0	26.560 <sup>117</sup>	15.99 <sup>34</sup>	57.591 <sup>128</sup>	43.65 <sup>113</sup>	35.830 <sup>80</sup>	72.03 <sup>358</sup>	51.302 <sup>103</sup>	55.91 <sup>37</sup>
27.0	26.677 <sup>167</sup>	15.65 <sup>5</sup>	57.719 <sup>185</sup>	42.52 <sup>83</sup>	35.910 <sup>151</sup>	68.45 <sup>362</sup>	51.405 <sup>150</sup>	56.28 <sup>65</sup>
Nov. 5.9	26.844 <sup>216</sup>	15.60 <sup>28</sup>	57.904 <sup>239</sup>	41.69 <sup>48</sup>	36.061 <sup>221</sup>	64.83 <sup>359</sup>	51.555 <sup>196</sup>	56.93 <sup>93</sup>
15.9	27.060 <sup>261</sup>	15.88 <sup>63</sup>	58.143 <sup>290</sup>	41.21 <sup>7</sup>	36.282 <sup>289</sup>	61.24 <sup>344</sup>	51.751 <sup>240</sup>	57.86 <sup>121</sup>
25.9	27.321 <sup>300</sup>	16.51 <sup>96</sup>	58.433 <sup>332</sup>	41.14 <sup>35</sup>	36.571 <sup>351</sup>	57.80 <sup>322</sup>	51.991 <sup>277</sup>	59.07 <sup>146</sup>
Dec. 5.8	27.621 <sup>329</sup>	17.47 <sup>129</sup>	58.765 <sup>366</sup>	41.49 <sup>76</sup>	36.922 <sup>404</sup>	54.58 <sup>289</sup>	52.268 <sup>308</sup>	60.53 <sup>169</sup>
15.8	27.950 <sup>330</sup>	18.76 <sup>158</sup>	59.131 <sup>387</sup>	42.25 <sup>116</sup>	37.326 <sup>445</sup>	51.69 <sup>247</sup>	52.576 <sup>328</sup>	62.22 <sup>186</sup>
25.8	28.300 <sup>356</sup>	20.34 <sup>180</sup>	59.518 <sup>397</sup>	43.41 <sup>154</sup>	37.771 <sup>471</sup>	49.22 <sup>197</sup>	52.904 <sup>338</sup>	64.08 <sup>196</sup>
35.8	28.656	22.14	59.915	44.95	38.242	47.25	53.242	66.04
Mean Place	24.338	2.20	55.465	29.40	35.249	90.68	49.090	42.19
Sec $\delta$ , Tan $\delta$	1.084	-0.419	1.240	-0.734	1.759	+1.447	1.018	-0.189
$D\phi\alpha$ , $D\omega\alpha$	+0.06	-0.03	+0.07	-0.05	+0.05	+0.09	+0.06	-0.01
$D\phi\delta$ , $D\omega\delta$	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3



## APPARENT PLACES OF STARS, 1917.

423

**FOR THE UPPER TRANSIT AT WASHINGTON.**

Washington Mean Time.		Groombridge 2001. Mag. 6.1		70 Virginis. Mag. 5.2		ζ Virginis. Mag. 3.4		17 H. Canum. Venat. Mag. 5.0	
		Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
		h m 13 23	° ' " +72 48	h m 13 24	° ' " +14 12	h m 13 30	° ' " - 0 10	h m 13 31	° ' " +37 35
		s "	"	s "	"	s "	"	s "	"
Jan.	0.8	61.06	53.20	22.964	64.74	28.443	27.34	6.195	66.10
	10.8	61.88	51.87	23.302	62.63	28.778	29.41	6.574	64.10
	20.7	62.70	51.19	23.636	60.77	29.108	31.38	6.954	62.58
	30.7	63.51	51.19	23.956	59.24	29.425	33.18	7.322	61.59
Feb.	9.7	64.27	51.85	24.253	58.08	29.719	34.74	7.666	61.16
	19.6	64.96	53.13	24.520	57.31	29.986	36.06	7.978	61.26
Mar.	1.6	65.56	54.98	24.754	56.92	30.221	37.08	8.251	61.89
	11.6	66.03	57.31	24.950	56.90	30.420	37.81	8.480	63.00
	21.6	66.38	60.01	25.109	57.23	30.584	38.26	8.662	64.52
	31.5	66.60	62.95	25.230	57.86	30.713	38.44	8.797	66.36
Apr.	10.5	66.68	66.05	25.315	58.74	30.809	38.39	8.886	68.45
	20.5	66.63	69.16	25.367	59.80	30.874	38.13	8.932	70.68
	30.5	66.46	72.16	25.388	60.99	30.911	37.71	8.937	72.97
May	10.4	66.18	74.96	25.383	62.24	30.921	37.16	8.905	75.22
	20.4	65.80	77.45	25.353	63.51	30.907	36.53	8.840	77.35
	30.4	65.32	79.56	25.302	64.74	30.872	35.82	8.748	79.31
June	9.3	64.78	81.24	25.231	65.88	30.818	35.10	8.630	81.01
	19.3	64.19	82.42	25.145	66.91	30.746	34.37	8.492	82.42
	29.3	63.56	83.09	25.045	67.80	30.660	33.67	8.338	83.49
July	9.3	62.92	83.22	24.934	68.51	30.561	32.99	8.171	84.20
	19.2	62.27	82.81	24.816	69.04	30.453	32.37	7.997	84.53
	29.2	61.63	81.86	24.695	69.35	30.340	31.82	7.821	84.47
Aug.	8.2	61.01	80.41	24.574	69.46	30.225	31.36	7.647	84.02
	18.2	60.43	78.48	24.459	69.32	30.114	31.00	7.481	83.18
	28.1	59.91	76.10	24.354	68.96	30.012	30.78	7.328	81.95
Sept.	7.1	59.45	73.33	24.267	68.35	29.926	30.70	7.195	80.36
	17.1	59.09	70.20	24.203	67.49	29.863	30.79	7.092	78.43
	27.0	58.81	66.78	24.169	66.36	29.829	31.09	7.023	76.17
Oct.	7.0	58.63	63.15	24.170	64.99	29.830	31.60	6.994	73.62
	17.0	58.57	59.36	24.212	63.36	29.872	32.35	7.013	70.84
	27.0	58.64	55.51	24.299	61.50	29.959	33.34	7.083	67.85
Nov.	5.9	58.83	51.68	24.432	59.41	30.093	34.60	7.207	64.73
	15.9	59.15	47.97	24.612	57.16	30.273	36.08	7.386	61.54
	25.9	59.59	44.47	24.837	54.78	30.497	37.80	7.618	58.36
Dec.	5.9	60.15	41.29	25.101	52.33	30.759	39.68	7.897	55.29
	15.8	60.80	38.52	25.397	49.88	31.053	41.69	8.217	52.39
	25.8	61.53	36.24	25.715	47.50	31.369	43.78	8.568	49.79
	35.8	62.32	34.54	26.047	45.27	31.697	45.87	8.938	47.55
Mean Place		60.915	79.90	22.227	78.23	27.735	18.77	5.572	86.55
Sec δ, Tan δ		3.385	+3.234	1.032	+0.253	1.000	-0.003	1.262	+0.770
Dψ α, Dω α		+0.03	+0.20	+0.06	+0.02	+0.06	0.00	+0.05	+0.05
Dψ δ, Dω δ		-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4



## APPARENT PLACES OF STARS, 1917.

**FOR THE UPPER TRANSIT AT WASHINGTON.**

Washington Mean Time.		ε Centauri. Mag. 2.6		m Virginis. Mag. 5.2		τ Boötis. Mag. 4.5		η Ursæ Majoris. (Alkaid). Mag. 1.9	
		Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
		h m 13 34	° ' -53 2	h m 13 37	° ' - 8 17	h m 13 43	° ' +17 51	h m 13 44	° ' +49 42
		s "	"	s "	"	s "	"	s "	"
Jan.	0.8	37.607	34.11	15.868	10.32	19.678	57.21	16.726	74.54
	10.8	38.113 <sup>506</sup>	35.32 <sup>121</sup>	16.207 <sup>339</sup>	12.31 <sup>199</sup>	20.015 <sup>337</sup>	55.08 <sup>213</sup>	17.155 <sup>429</sup>	72.56 <sup>198</sup>
	20.7	38.610 <sup>497</sup>	36.96 <sup>164</sup>	16.542 <sup>335</sup>	14.28 <sup>197</sup>	20.351 <sup>336</sup>	53.22 <sup>186</sup>	17.591 <sup>436</sup>	71.15 <sup>141</sup>
	30.7	39.089 <sup>479</sup>	38.98 <sup>202</sup>	16.865 <sup>323</sup>	16.18 <sup>190</sup>	20.678 <sup>327</sup>	51.72 <sup>150</sup>	18.019 <sup>428</sup>	70.33 <sup>82</sup>
Feb.	9.7	39.536 <sup>447</sup>	41.31 <sup>233</sup>	17.167 <sup>302</sup>	17.94 <sup>176</sup>	20.985 <sup>307</sup>	50.62 <sup>110</sup>	18.425 <sup>406</sup>	70.13 <sup>20</sup>
		407	258	275	157	281	68	373	41
	19.7	39.943	43.89	17.442	19.51	21.266	49.94	18.798	70.54
Mar.	1.6	40.303 <sup>360</sup>	46.64 <sup>275</sup>	17.684 <sup>242</sup>	20.87 <sup>136</sup>	21.515 <sup>249</sup>	49.69 <sup>25</sup>	19.127 <sup>329</sup>	71.54 <sup>100</sup>
	11.6	40.613 <sup>310</sup>	49.51 <sup>287</sup>	17.893 <sup>209</sup>	21.99 <sup>112</sup>	21.729 <sup>214</sup>	49.84 <sup>15</sup>	19.404 <sup>277</sup>	73.05 <sup>151</sup>
	21.6	40.872 <sup>259</sup>	52.42 <sup>291</sup>	18.067 <sup>174</sup>	22.88 <sup>89</sup>	21.905 <sup>176</sup>	50.36 <sup>52</sup>	19.627 <sup>223</sup>	75.01 <sup>196</sup>
	31.5	41.078 <sup>206</sup>	55.32 <sup>290</sup>	18.207 <sup>140</sup>	23.52 <sup>64</sup>	22.045 <sup>140</sup>	51.21 <sup>85</sup>	19.793 <sup>166</sup>	77.31 <sup>230</sup>
		154	283	106	43	103	112	108	255
Apr.	10.5	41.232	58.15	18.313	23.95	22.148	52.33	19.901	79.86
	20.5	41.336 <sup>104</sup>	60.86 <sup>271</sup>	18.388 <sup>75</sup>	24.17 <sup>22</sup>	22.217 <sup>69</sup>	53.64 <sup>131</sup>	19.953 <sup>52</sup>	82.55 <sup>269</sup>
	30.5	41.391 <sup>55</sup>	63.40 <sup>254</sup>	18.436 <sup>48</sup>	24.22 <sup>5</sup>	22.253 <sup>36</sup>	55.08 <sup>144</sup>	19.951 <sup>2</sup>	85.28 <sup>273</sup>
May	10.4	41.399 <sup>8</sup>	65.72 <sup>232</sup>	18.455 <sup>19</sup>	24.11 <sup>11</sup>	22.261 <sup>8</sup>	56.58 <sup>150</sup>	19.903 <sup>48</sup>	87.94 <sup>266</sup>
	20.4	41.363 <sup>36</sup>	67.78 <sup>206</sup>	18.451 <sup>4</sup>	23.86 <sup>25</sup>	22.242 <sup>19</sup>	58.09 <sup>151</sup>	19.810 <sup>93</sup>	90.44 <sup>250</sup>
		79	177	27	34	42	146	133	226
	30.4	41.284	69.55	18.424	23.52	22.200	59.55	19.677	92.70
June	9.4	41.167 <sup>117</sup>	71.00 <sup>145</sup>	18.377 <sup>47</sup>	23.09 <sup>43</sup>	22.134 <sup>66</sup>	60.91 <sup>136</sup>	19.511 <sup>166</sup>	94.64 <sup>194</sup>
	19.3	41.014 <sup>153</sup>	72.08 <sup>106</sup>	18.310 <sup>67</sup>	22.60 <sup>49</sup>	22.051 <sup>83</sup>	62.11 <sup>120</sup>	19.318 <sup>193</sup>	96.23 <sup>159</sup>
	29.3	40.832 <sup>182</sup>	72.77 <sup>69</sup>	18.228 <sup>82</sup>	22.05 <sup>55</sup>	21.951 <sup>100</sup>	63.15 <sup>104</sup>	19.102 <sup>216</sup>	97.41 <sup>118</sup>
July	9.3	40.623 <sup>209</sup>	73.05 <sup>28</sup>	18.132 <sup>96</sup>	21.46 <sup>59</sup>	21.836 <sup>115</sup>	63.99 <sup>84</sup>	18.870 <sup>232</sup>	98.16 <sup>75</sup>
		227	12	108	60	124	61	243	29
	19.2	40.396	72.93	18.024	20.86	21.712	64.60	18.627	98.45
	29.2	40.159 <sup>237</sup>	72.40 <sup>53</sup>	17.909 <sup>115</sup>	20.24 <sup>62</sup>	21.581 <sup>131</sup>	64.97 <sup>37</sup>	18.380 <sup>247</sup>	98.28 <sup>17</sup>
Aug.	8.2	39.921 <sup>238</sup>	71.47 <sup>93</sup>	17.792 <sup>117</sup>	19.64 <sup>60</sup>	21.447 <sup>134</sup>	65.08 <sup>11</sup>	18.135 <sup>245</sup>	97.64 <sup>64</sup>
	18.2	39.691 <sup>230</sup>	70.17 <sup>130</sup>	17.678 <sup>114</sup>	19.07 <sup>57</sup>	21.317 <sup>130</sup>	64.93 <sup>15</sup>	17.898 <sup>237</sup>	96.55 <sup>109</sup>
	28.1	39.482 <sup>209</sup>	68.55 <sup>162</sup>	17.572 <sup>106</sup>	18.55 <sup>52</sup>	21.196 <sup>121</sup>	64.52 <sup>41</sup>	17.679 <sup>219</sup>	95.02 <sup>153</sup>
		177	189	91	43	107	70	196	194
Sept.	7.1	39.305	66.66	17.481	18.12	21.089	63.82	17.483	93.08
	17.1	39.170 <sup>135</sup>	64.55 <sup>211</sup>	17.414 <sup>67</sup>	17.81 <sup>31</sup>	21.003 <sup>86</sup>	62.86 <sup>96</sup>	17.320 <sup>163</sup>	90.76 <sup>232</sup>
	27.1	39.088 <sup>82</sup>	62.32 <sup>223</sup>	17.375 <sup>39</sup>	17.66 <sup>15</sup>	20.947 <sup>56</sup>	61.61 <sup>125</sup>	17.198 <sup>122</sup>	88.09 <sup>267</sup>
Oct.	7.0	39.070 <sup>18</sup>	60.06 <sup>226</sup>	17.371 <sup>4</sup>	17.69 <sup>3</sup>	20.926 <sup>21</sup>	60.08 <sup>153</sup>	17.123 <sup>75</sup>	85.12 <sup>297</sup>
	17.0	39.123 <sup>53</sup>	57.86 <sup>220</sup>	17.410 <sup>39</sup>	17.94 <sup>25</sup>	20.945 <sup>19</sup>	58.31 <sup>177</sup>	17.104 <sup>19</sup>	81.91 <sup>321</sup>
		128	204	84	48	64	202	42	340
	27.0	39.251	55.82	17.494	18.42	21.009	56.29	17.146	78.51
Nov.	5.9	39.454 <sup>203</sup>	54.03 <sup>179</sup>	17.626 <sup>132</sup>	19.17 <sup>75</sup>	21.122 <sup>113</sup>	54.06 <sup>223</sup>	17.250 <sup>104</sup>	74.99 <sup>352</sup>
	15.9	39.732 <sup>278</sup>	52.57 <sup>146</sup>	17.806 <sup>180</sup>	20.18 <sup>101</sup>	21.283 <sup>161</sup>	51.66 <sup>240</sup>	17.420 <sup>170</sup>	71.45 <sup>354</sup>
	25.9	40.077 <sup>345</sup>	51.52 <sup>105</sup>	18.030 <sup>224</sup>	21.46 <sup>128</sup>	21.490 <sup>207</sup>	49.14 <sup>252</sup>	17.655 <sup>235</sup>	67.98 <sup>347</sup>
Dec.	5.9	40.481 <sup>404</sup>	50.93 <sup>59</sup>	18.294 <sup>264</sup>	22.96 <sup>150</sup>	21.739 <sup>249</sup>	46.56 <sup>258</sup>	17.949 <sup>294</sup>	64.66 <sup>332</sup>
		450	10	296	171	294	255	345	306
	15.8	40.931	50.83	18.590	24.67	22.023	44.01	18.294	61.60
	25.8	41.414 <sup>483</sup>	51.23 <sup>40</sup>	18.910 <sup>320</sup>	26.53 <sup>186</sup>	22.336 <sup>313</sup>	41.55 <sup>246</sup>	18.681 <sup>387</sup>	58.89 <sup>271</sup>
	35.8	41.913 <sup>499</sup>	52.12 <sup>89</sup>	19.243 <sup>333</sup>	28.48 <sup>195</sup>	22.664 <sup>328</sup>	39.26 <sup>229</sup>	19.096 <sup>415</sup>	56.62 <sup>227</sup>
Mean Place		37.129	41.91	15.201	4.56	19.071	71.79	16.341	97.57
Sec δ, Tan δ		1.664	-1.329	1.011	-0.146	1.051	+0.322	1.547	+1.180
Dδ a, Dα a		+0.08	-0.08	+0.06	-0.01	+0.06	+0.02	+0.05	+0.07
Dδ δ, Dα δ		-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	89 Virginis. Mag. 5.1		ζ Centauri. Mag. 3.1		77 Boötis. Mag. 2.8		θ Apodis. Var. 5.5-6.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 45 s	° ' " -17 43 "	h m 13 50 s	° ' " -46 52 "	h m 13 50 s	° ' " +18 48 "	h m 13 57 s	° ' " -76 23 "
Jan. 0.8	22.101	18.71	21.669	43.34	44.523	33.19	11.00	37.57
10.8	22.450 <sup>349</sup>	20.53 <sup>182</sup>	22.126 <sup>457</sup>	44.50 <sup>116</sup>	44.860 <sup>337</sup>	31.00 <sup>219</sup>	12.14 <sup>114</sup>	37.85 <sup>28</sup>
20.7	22.798 <sup>348</sup>	22.45 <sup>192</sup>	22.579 <sup>453</sup>	46.05 <sup>155</sup>	45.198 <sup>338</sup>	29.11 <sup>189</sup>	13.27 <sup>113</sup>	38.70 <sup>85</sup>
30.7	23.134 <sup>336</sup>	24.39 <sup>194</sup>	23.017 <sup>438</sup>	47.92 <sup>187</sup>	45.528 <sup>330</sup>	27.59 <sup>152</sup>	14.39 <sup>112</sup>	40.12 <sup>142</sup>
Feb. 9.7	23.448 <sup>314</sup>	26.30 <sup>191</sup>	23.432 <sup>415</sup>	50.06 <sup>214</sup>	45.839 <sup>311</sup>	26.48 <sup>111</sup>	15.45 <sup>106</sup>	42.00 <sup>188</sup>
	289	183	381	235	267	68	99	233
19.7	23.737	28.13	23.813	52.41	46.126	25.80	16.44	44.33
Mar. 1.6	23.994 <sup>257</sup>	29.82 <sup>169</sup>	24.156 <sup>343</sup>	54.91 <sup>250</sup>	46.381 <sup>255</sup>	25.55 <sup>25</sup>	17.33 <sup>89</sup>	47.05 <sup>272</sup>
11.6	24.217 <sup>223</sup>	31.36 <sup>154</sup>	24.456 <sup>300</sup>	57.49 <sup>258</sup>	46.602 <sup>221</sup>	25.72 <sup>17</sup>	18.12 <sup>79</sup>	50.06 <sup>301</sup>
21.6	24.406 <sup>189</sup>	32.72 <sup>136</sup>	24.711 <sup>255</sup>	60.09 <sup>260</sup>	46.787 <sup>185</sup>	26.27 <sup>55</sup>	18.79 <sup>67</sup>	53.29 <sup>323</sup>
31.6	24.560 <sup>154</sup>	33.88 <sup>116</sup>	24.921 <sup>210</sup>	62.66 <sup>257</sup>	46.934 <sup>147</sup>	27.15 <sup>88</sup>	19.34 <sup>55</sup>	56.68 <sup>339</sup>
	120	97	165	251	111	117	41	346
Apr. 10.5	24.680	34.85	25.086	65.17	47.045	28.32	19.75	60.14
20.5	24.770 <sup>90</sup>	35.62 <sup>77</sup>	25.207 <sup>121</sup>	67.56 <sup>239</sup>	47.122 <sup>77</sup>	29.68 <sup>136</sup>	20.03 <sup>28</sup>	63.61 <sup>347</sup>
30.5	24.829 <sup>59</sup>	36.23 <sup>61</sup>	25.286 <sup>79</sup>	69.79 <sup>223</sup>	47.167 <sup>45</sup>	31.17 <sup>149</sup>	20.17 <sup>14</sup>	67.00 <sup>339</sup>
May 10.4	24.860	36.66	25.323 <sup>37</sup>	71.83 <sup>204</sup>	47.181 <sup>14</sup>	32.73 <sup>156</sup>	20.18 <sup>1</sup>	70.25 <sup>325</sup>
20.4	24.865 <sup>5</sup>	36.92 <sup>26</sup>	25.321 <sup>2</sup>	73.65 <sup>182</sup>	47.168 <sup>13</sup>	34.30 <sup>157</sup>	20.06 <sup>12</sup>	73.29 <sup>304</sup>
	20	12	40	156	38	152	25	281
30.4	24.845	37.04	25.281	75.21	47.130	35.82	19.81	76.10
June 9.4	24.803 <sup>42</sup>	37.01 <sup>3</sup>	25.204 <sup>77</sup>	76.48 <sup>127</sup>	47.070 <sup>60</sup>	37.23 <sup>141</sup>	19.44 <sup>37</sup>	78.52 <sup>242</sup>
19.3	24.739 <sup>64</sup>	36.83 <sup>18</sup>	25.094 <sup>110</sup>	77.45 <sup>97</sup>	46.989 <sup>81</sup>	38.50 <sup>127</sup>	18.97 <sup>47</sup>	80.58 <sup>206</sup>
29.3	24.656 <sup>83</sup>	36.53 <sup>80</sup>	24.956 <sup>138</sup>	78.07 <sup>62</sup>	46.890 <sup>99</sup>	39.58 <sup>108</sup>	18.39 <sup>58</sup>	82.18 <sup>160</sup>
July 9.3	24.557 <sup>99</sup>	36.12 <sup>41</sup>	24.791 <sup>165</sup>	78.34 <sup>27</sup>	46.776 <sup>114</sup>	40.45 <sup>87</sup>	17.74 <sup>65</sup>	83.33 <sup>115</sup>
	112	53	185	9	125	63	70	60
19.3	24.445	35.59	24.606	78.25	46.651	41.08	17.04	83.93
29.2	24.323 <sup>122</sup>	34.97 <sup>62</sup>	24.408 <sup>198</sup>	77.82 <sup>43</sup>	46.518 <sup>133</sup>	41.47 <sup>39</sup>	16.29 <sup>75</sup>	84.00 <sup>7</sup>
Aug. 8.2	24.197 <sup>126</sup>	34.25 <sup>72</sup>	24.204 <sup>204</sup>	77.02 <sup>80</sup>	46.381 <sup>137</sup>	41.59 <sup>12</sup>	15.54 <sup>75</sup>	83.54 <sup>46</sup>
18.2	24.072 <sup>125</sup>	33.48 <sup>77</sup>	24.003 <sup>201</sup>	75.90 <sup>112</sup>	46.247 <sup>134</sup>	41.43 <sup>16</sup>	14.81 <sup>73</sup>	82.55 <sup>99</sup>
28.1	23.956 <sup>116</sup>	32.69 <sup>79</sup>	23.816 <sup>188</sup>	74.50 <sup>140</sup>	46.120 <sup>127</sup>	41.01 <sup>42</sup>	14.12 <sup>69</sup>	81.05 <sup>150</sup>
	101	79	164	166	113	72	60	195
Sept. 7.1	23.855	31.90	23.651	72.84	46.007	40.29	13.52	79.10
17.1	23.777 <sup>78</sup>	31.16 <sup>74</sup>	23.521 <sup>130</sup>	71.00 <sup>184</sup>	45.915 <sup>92</sup>	39.30 <sup>99</sup>	13.02 <sup>50</sup>	76.78 <sup>232</sup>
27.1	23.729 <sup>48</sup>	30.51 <sup>65</sup>	23.436 <sup>85</sup>	69.06 <sup>194</sup>	45.851 <sup>64</sup>	38.01 <sup>129</sup>	12.65 <sup>37</sup>	74.14 <sup>264</sup>
Oct. 7.0	23.719 <sup>10</sup>	29.99 <sup>52</sup>	23.405 <sup>31</sup>	67.08 <sup>198</sup>	45.822 <sup>29</sup>	36.45 <sup>156</sup>	12.44 <sup>21</sup>	71.30 <sup>284</sup>
17.0	23.753 <sup>34</sup>	29.66 <sup>33</sup>	23.434 <sup>29</sup>	65.16 <sup>192</sup>	45.834 <sup>12</sup>	34.63 <sup>182</sup>	12.41 <sup>3</sup>	68.34 <sup>296</sup>
	81	11	97	178	57	207	14	294
27.0	23.834	29.55	23.531	63.38	45.891	32.56	12.55	65.40
Nov. 6.0	23.965 <sup>131</sup>	29.71 <sup>16</sup>	23.695 <sup>164</sup>	61.83 <sup>155</sup>	45.995 <sup>104</sup>	30.28 <sup>228</sup>	12.89 <sup>34</sup>	62.60 <sup>280</sup>
15.9	24.146 <sup>181</sup>	30.14 <sup>43</sup>	23.928 <sup>233</sup>	60.59 <sup>124</sup>	46.149 <sup>154</sup>	27.83 <sup>245</sup>	13.40 <sup>51</sup>	60.04 <sup>256</sup>
25.9	24.374 <sup>228</sup>	30.88 <sup>74</sup>	24.223 <sup>295</sup>	59.72 <sup>87</sup>	46.350 <sup>201</sup>	25.25 <sup>258</sup>	14.09 <sup>69</sup>	57.83 <sup>221</sup>
Dec. 5.9	24.644 <sup>270</sup>	31.90 <sup>102</sup>	24.573 <sup>350</sup>	59.25 <sup>47</sup>	46.595 <sup>245</sup>	22.63 <sup>262</sup>	14.92 <sup>83</sup>	56.08 <sup>175</sup>
	305	131	396	1	280	260	96	125
15.8	24.949	33.21	24.969	59.24	46.875	20.03	15.88	54.83
25.8	25.277 <sup>328</sup>	34.74 <sup>153</sup>	25.397 <sup>428</sup>	59.68 <sup>44</sup>	47.185 <sup>310</sup>	17.53 <sup>250</sup>	16.92 <sup>104</sup>	54.14 <sup>69</sup>
35.8	25.621 <sup>344</sup>	36.46 <sup>172</sup>	25.845 <sup>448</sup>	60.57 <sup>89</sup>	47.512 <sup>327</sup>	15.20 <sup>233</sup>	18.03 <sup>111</sup>	54.05 <sup>9</sup>
Mean Place	21.487	16.12	21.223	49.39	43.968	47.97	11.699	48.82
Sec δ, Tan δ	1.050	-0.320	1.463	-1.068	1.056	+0.341	4.253	-4.134
Dφ α, Dω α	+0.06	-0.02	+0.07	-0.06	+0.06	+0.02	+0.11	-0.2A
Dφ δ, Dω δ	-0.4	-0.4	-0.4	-0.5	-0.4	-0.5	-0.3	-0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	11 Boötis. Mag. 6.1		τ Virginis. Mag. 4.3		β Centauri. Mag. 0.9		π Hydræ. Mag. 3.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 13 57	° ' +27 46	h m 13 57	° ' + 1 56	h m 13 57	° ' -59 58	h m 14 1	° ' -26 16
	s "	"	s "	"	s "	"	s "	"
Jan. 0.8	25.195 <sup>347</sup>	55.66 <sup>221</sup>	25.821 <sup>330</sup>	35.33 <sup>206</sup>	57.425 <sup>587</sup>	14.73 <sup>72</sup>	38.954 <sup>366</sup>	59.14 <sup>155</sup>
10.8	25.542 <sup>351</sup>	53.45 <sup>183</sup>	26.151 <sup>331</sup>	33.27 <sup>194</sup>	58.012 <sup>587</sup>	15.45 <sup>120</sup>	39.320 <sup>366</sup>	60.69 <sup>174</sup>
20.7	25.893 <sup>345</sup>	51.62 <sup>139</sup>	26.482 <sup>322</sup>	31.33 <sup>176</sup>	58.599 <sup>573</sup>	16.65 <sup>164</sup>	39.686 <sup>356</sup>	62.43 <sup>185</sup>
30.7	26.238 <sup>328</sup>	50.23 <sup>91</sup>	26.804 <sup>305</sup>	29.57 <sup>151</sup>	59.172 <sup>544</sup>	18.29 <sup>203</sup>	40.042 <sup>339</sup>	64.28 <sup>193</sup>
Feb. 9.7	26.566 <sup>302</sup>	49.32 <sup>40</sup>	27.109 <sup>283</sup>	28.06 <sup>123</sup>	59.716 <sup>505</sup>	20.32 <sup>235</sup>	40.381 <sup>313</sup>	66.21 <sup>193</sup>
19.7	26.868 <sup>271</sup>	48.92 <sup>10</sup>	27.392 <sup>252</sup>	26.83 <sup>93</sup>	60.221 <sup>457</sup>	22.67 <sup>263</sup>	40.694 <sup>285</sup>	68.14 <sup>190</sup>
Mar. 1.6	27.139 <sup>236</sup>	49.02 <sup>56</sup>	27.644 <sup>221</sup>	25.90 <sup>61</sup>	60.678 <sup>403</sup>	25.30 <sup>280</sup>	40.979 <sup>250</sup>	70.04 <sup>181</sup>
11.6	27.375 <sup>197</sup>	49.58 <sup>97</sup>	27.865 <sup>190</sup>	25.29 <sup>31</sup>	61.081 <sup>346</sup>	28.10 <sup>293</sup>	41.229 <sup>215</sup>	71.85 <sup>170</sup>
21.6	27.572 <sup>157</sup>	50.55 <sup>135</sup>	28.055 <sup>154</sup>	24.98 <sup>4</sup>	61.427 <sup>285</sup>	31.03 <sup>300</sup>	41.444 <sup>181</sup>	73.55 <sup>157</sup>
31.6	27.729 <sup>118</sup>	51.90 <sup>164</sup>	28.209 <sup>122</sup>	24.94 <sup>23</sup>	61.712 <sup>225</sup>	34.03 <sup>300</sup>	41.625 <sup>147</sup>	75.12 <sup>142</sup>
Apr. 10.5	27.847 <sup>79</sup>	53.54 <sup>183</sup>	28.331 <sup>92</sup>	25.17 <sup>42</sup>	61.937 <sup>164</sup>	37.03 <sup>294</sup>	41.772 <sup>112</sup>	76.54 <sup>126</sup>
20.5	27.926 <sup>45</sup>	55.37 <sup>195</sup>	28.423 <sup>61</sup>	25.59 <sup>59</sup>	62.101 <sup>104</sup>	39.97 <sup>283</sup>	41.884 <sup>82</sup>	77.80 <sup>107</sup>
30.5	27.971 <sup>11</sup>	57.32 <sup>200</sup>	28.484 <sup>34</sup>	26.18 <sup>73</sup>	62.205 <sup>44</sup>	42.80 <sup>265</sup>	41.966 <sup>51</sup>	78.87 <sup>91</sup>
May 10.4	27.982 <sup>20</sup>	59.32 <sup>197</sup>	28.518 <sup>9</sup>	26.91 <sup>80</sup>	62.249 <sup>14</sup>	45.45 <sup>245</sup>	42.017 <sup>21</sup>	79.78 <sup>73</sup>
20.4	27.962 <sup>47</sup>	61.29 <sup>187</sup>	28.527 <sup>16</sup>	27.71 <sup>85</sup>	62.235 <sup>69</sup>	47.90 <sup>217</sup>	42.038 <sup>6</sup>	80.51 <sup>57</sup>
30.4	27.915 <sup>74</sup>	63.16 <sup>170</sup>	28.511 <sup>38</sup>	28.56 <sup>86</sup>	62.166 <sup>122</sup>	50.07 <sup>186</sup>	42.032 <sup>35</sup>	81.08 <sup>38</sup>
June 9.4	27.841 <sup>95</sup>	64.86 <sup>150</sup>	28.473 <sup>58</sup>	29.42 <sup>84</sup>	62.044 <sup>171</sup>	51.93 <sup>151</sup>	41.997 <sup>58</sup>	81.46 <sup>19</sup>
19.3	27.746 <sup>116</sup>	66.36 <sup>124</sup>	28.415 <sup>78</sup>	30.26 <sup>81</sup>	61.873 <sup>216</sup>	53.44 <sup>111</sup>	41.939 <sup>83</sup>	81.65 <sup>1</sup>
29.3	27.630 <sup>132</sup>	67.60 <sup>96</sup>	28.337 <sup>94</sup>	31.07 <sup>73</sup>	61.657 <sup>252</sup>	54.55 <sup>69</sup>	41.856 <sup>102</sup>	81.66 <sup>19</sup>
July 9.3	27.498 <sup>144</sup>	68.56 <sup>65</sup>	28.243 <sup>107</sup>	31.80 <sup>66</sup>	61.405 <sup>281</sup>	55.24 <sup>25</sup>	41.754 <sup>120</sup>	81.47 <sup>34</sup>
19.3	27.354 <sup>153</sup>	69.21 <sup>32</sup>	28.136 <sup>118</sup>	32.46 <sup>56</sup>	61.124 <sup>302</sup>	55.49 <sup>19</sup>	41.634 <sup>132</sup>	81.13 <sup>54</sup>
29.2	27.201 <sup>156</sup>	69.53 <sup>0</sup>	28.018 <sup>122</sup>	33.02 <sup>45</sup>	60.822 <sup>309</sup>	55.30 <sup>64</sup>	41.502 <sup>141</sup>	80.59 <sup>70</sup>
Aug. 8.2	27.045 <sup>155</sup>	69.53 <sup>36</sup>	27.896 <sup>123</sup>	33.47 <sup>32</sup>	60.513 <sup>304</sup>	54.66 <sup>108</sup>	41.361 <sup>140</sup>	79.89 <sup>83</sup>
18.2	26.890 <sup>148</sup>	69.17 <sup>69</sup>	27.773 <sup>117</sup>	33.79 <sup>17</sup>	60.209 <sup>287</sup>	53.58 <sup>147</sup>	41.221 <sup>135</sup>	79.06 <sup>95</sup>
28.1	26.742 <sup>133</sup>	68.48 <sup>104</sup>	27.656 <sup>105</sup>	33.96 <sup>1</sup>	59.922 <sup>253</sup>	52.11 <sup>181</sup>	41.086 <sup>120</sup>	78.11 <sup>102</sup>
Sept. 7.1	26.609 <sup>110</sup>	67.44 <sup>135</sup>	27.551 <sup>85</sup>	33.97 <sup>18</sup>	59.669 <sup>206</sup>	50.30 <sup>211</sup>	40.966 <sup>100</sup>	77.09 <sup>106</sup>
17.1	26.499 <sup>82</sup>	63.09 <sup>169</sup>	27.466 <sup>58</sup>	33.79 <sup>37</sup>	59.463 <sup>145</sup>	48.19 <sup>232</sup>	40.866 <sup>65</sup>	76.03 <sup>104</sup>
27.1	26.417 <sup>47</sup>	64.40 <sup>199</sup>	27.408 <sup>25</sup>	33.42 <sup>61</sup>	59.318 <sup>73</sup>	45.87 <sup>244</sup>	40.801 <sup>28</sup>	74.99 <sup>97</sup>
Oct. 7.0	26.370 <sup>4</sup>	62.41 <sup>225</sup>	27.383 <sup>15</sup>	32.81 <sup>83</sup>	59.245 <sup>10</sup>	43.43 <sup>247</sup>	40.773 <sup>17</sup>	74.02 <sup>84</sup>
17.0	26.366 <sup>43</sup>	60.16 <sup>251</sup>	27.398 <sup>59</sup>	31.98 <sup>108</sup>	59.255 <sup>99</sup>	40.96 <sup>239</sup>	40.790 <sup>69</sup>	73.18 <sup>65</sup>
27.0	26.409 <sup>95</sup>	57.65 <sup>269</sup>	27.457 <sup>107</sup>	30.90 <sup>131</sup>	59.354 <sup>191</sup>	38.57 <sup>220</sup>	40.859 <sup>122</sup>	72.53 <sup>42</sup>
Nov. 6.0	26.504 <sup>145</sup>	54.96 <sup>284</sup>	27.564 <sup>154</sup>	29.59 <sup>156</sup>	59.545 <sup>282</sup>	36.37 <sup>193</sup>	40.981 <sup>176</sup>	72.11 <sup>12</sup>
15.9	26.649 <sup>195</sup>	52.12 <sup>292</sup>	27.718 <sup>200</sup>	28.03 <sup>176</sup>	59.827 <sup>365</sup>	34.44 <sup>156</sup>	41.157 <sup>227</sup>	71.99 <sup>18</sup>
25.9	26.844 <sup>242</sup>	49.20 <sup>292</sup>	27.918 <sup>242</sup>	26.27 <sup>192</sup>	60.192 <sup>439</sup>	32.88 <sup>113</sup>	41.384 <sup>273</sup>	72.17 <sup>49</sup>
Dec. 5.9	27.086 <sup>282</sup>	46.28 <sup>283</sup>	28.160 <sup>276</sup>	24.35 <sup>204</sup>	60.631 <sup>501</sup>	31.75 <sup>65</sup>	41.657 <sup>311</sup>	72.66 <sup>83</sup>
15.8	27.368 <sup>315</sup>	43.45 <sup>265</sup>	28.436 <sup>305</sup>	22.31 <sup>210</sup>	61.132 <sup>547</sup>	31.10 <sup>13</sup>	41.968 <sup>339</sup>	73.49 <sup>113</sup>
25.8	27.683 <sup>335</sup>	40.80 <sup>241</sup>	28.741 <sup>321</sup>	20.21 <sup>209</sup>	61.679 <sup>575</sup>	30.97 <sup>38</sup>	42.307 <sup>359</sup>	74.62 <sup>138</sup>
35.8	28.018	38.39	29.062	18.12	62.254	31.35	42.666	76.00
Mean Place	24.729	73.03	25.268	44.56	57.232	23.52	38.444	59.18
Sec δ, Tan δ	1.130	+0.527	1.001	+0.034	1.999	-1.730	1.115	-0.494
$D\psi a, D\omega a$	+0.05	+0.03	+0.06	0.00	+0.08	-0.10	+0.07	-0.03
$D\psi \delta, D\omega \delta$	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Centauri. Mag. 2.3		$\alpha$ Draconis. Mag. 3.6		$\delta$ Boötis. Mag. 4.8		$\kappa$ Virginis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 1	° ' " -35 57	h m 14 2	° ' " +64 45	h m 14 6	° ' " +25 28	h m 14 8	° ' " - 9 53
Jan. 0.8	47.982	40.91	8.29	55.03	37.278	46.75	28.455	21.85
10.8	48.379	42.23	8.86	53.08	37.618	44.50	28.791	23.70
20.8	48.776	43.84	9.45	51.75	37.963	42.59	29.129	25.56
30.7	49.162	45.67	10.05	51.07	38.304	41.11	29.459	27.36
Feb. 9.7	49.529	47.67	10.63	51.08	38.630	40.10	29.774	29.04
19.7	49.869	49.79	11.17	51.73	38.933	39.57	30.066	30.58
Mar. 1.6	50.176	51.95	11.65	53.00	39.208	39.53	30.331	31.92
11.6	50.447	54.12	12.06	54.83	39.447	39.96	30.567	33.03
21.6	50.682	56.24	12.39	57.13	39.650	40.81	30.770	33.92
31.6	50.878	58.29	12.64	59.80	39.815	42.03	30.940	34.58
Apr. 10.5	51.037	60.24	12.81	62.71	39.942	43.53	31.080	35.03
20.5	51.159	62.05	12.88	65.78	40.034	45.27	31.188	35.28
30.5	51.245	63.69	12.87	68.85	40.089	47.14	31.267	35.37
May 10.5	51.298	65.17	12.78	71.84	40.112	49.07	31.319	35.30
20.4	51.316	66.46	12.60	74.65	40.105	50.99	31.343	35.10
30.4	51.303	67.52	12.36	77.17	40.068	52.84	31.343	34.80
June 9.4	51.260	68.37	12.07	79.33	40.006	54.54	31.317	34.42
19.3	51.186	68.96	11.73	81.08	39.921	56.05	31.269	33.98
29.3	51.088	69.30	11.35	82.37	39.815	57.32	31.199	33.48
July 9.3	50.965	69.39	10.93	83.16	39.691	58.34	31.110	32.94
19.3	50.823	69.20	10.50	83.44	39.553	59.06	31.006	32.37
29.2	50.668	68.76	10.07	83.20	39.405	59.49	30.888	31.78
Aug. 8.2	50.503	68.06	9.63	82.44	39.251	59.58	30.763	31.20
18.2	50.339	67.13	9.20	81.17	39.097	59.34	30.636	30.63
28.2	50.182	65.99	8.80	79.42	38.949	58.78	30.513	30.10
Sept. 7.1	50.042	64.69	8.43	77.22	38.813	57.89	30.402	29.64
17.1	49.929	63.28	8.11	74.61	38.699	56.67	30.309	29.27
27.1	49.851	61.82	7.85	71.63	38.610	55.13	30.243	29.03
Oct. 7.0	49.816	60.38	7.67	68.35	38.557	53.30	30.211	28.94
17.0	49.832	59.02	7.55	64.82	38.545	51.18	30.220	29.05
27.0	49.904	57.82	7.52	61.12	38.580	48.82	30.274	29.38
Nov. 6.0	50.036	56.84	7.58	57.33	38.664	46.23	30.376	29.95
15.9	50.227	56.16	7.74	53.54	38.799	43.49	30.528	30.78
25.9	50.473	55.80	8.00	49.84	38.985	40.66	30.727	31.87
Dec. 5.9	50.769	55.80	8.34	46.36	39.217	37.80	30.970	33.18
15.9	51.106	56.19	8.76	43.18	39.490	34.99	31.249	34.71
25.8	51.473	56.95	9.25	40.40	39.796	32.34	31.557	36.39
35.8	51.860	58.05	9.79	38.12	40.124	29.91	31.883	38.18
Mean Place	47.518	43.84	8.553	80.01	36.864	63.30	27.955	16.58
Sec $\delta$ , Tan $\delta$	1.235	-0.726	2.346	+2.122	1.108	+0.476	1.015	-0.174
$D\psi\alpha$ , $D_\omega\alpha$	+0.07	-0.04	+0.03	+0.12	+0.05	+0.03	+0.06	-0.01
$D\psi\delta$ , $D_\omega\delta$	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	4 Ursæ Minoris. Mag. 5.0		ι Virginis. Mag. 4.2		α Boëtis. (Arcturus.) Mag. 0.2		λ Boëtis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 9	° ' " +77 55	h m 14 11	° ' " - 5 36	h m 14 11	° ' " +19 36	h m 14 13	° ' " +46 27
	s	"	s	"	s	"	s	"
Jan. 0.8	7.19	49.09	40.075	24.49	52.913	35.66	13.994	46.66
10.8	8.21	47.31	40.405	26.43	53.242	33.36	14.390	44.40
20.8	9.30	46.15	40.739	28.32	53.577	31.36	14.798	42.65
30.7	10.40	45.67	41.067	30.12	53.907	29.73	15.148	41.48
Feb. 9.7	11.49	45.86	41.378	31.75	54.224	28.51	15.543	40.92
19.7	12.51	46.72	41.669	33.19	54.519	27.73	15.915	40.98
Mar. 1.6	13.44	48.20	41.934	34.38	54.786	27.40	16.251	41.63
11.6	14.24	50.23	42.169	35.32	55.022	27.51	16.545	42.83
21.6	14.88	52.72	42.371	36.00	55.223	28.01	16.792	44.52
31.6	15.35	55.54	42.542	36.45	55.389	28.88	16.988	46.62
Apr. 10.5	15.62	58.61	42.683	36.65	55.519	30.04	17.133	49.02
20.5	15.72	61.79	42.791	36.66	55.615	31.42	17.226	51.64
30.5	15.62	64.96	42.871	36.49	55.678	32.96	17.270	54.36
May 10.5	15.36	68.01	42.923	36.18	55.710	34.60	17.266	57.07
20.4	14.94	70.84	42.948	35.76	55.714	36.23	17.220	59.68
30.4	14.36	73.36	42.949	35.26	55.689	37.83	17.132	62.13
June 9.4	13.65	75.49	42.924	34.70	55.639	39.34	17.008	64.32
19.3	12.84	77.18	42.877	34.10	55.565	40.70	16.852	66.19
29.3	11.95	78.37	42.808	33.49	55.472	41.86	16.670	67.69
July 9.3	11.00	79.05	42.721	32.87	55.359	42.82	16.464	68.79
19.3	10.01	79.19	42.617	32.27	55.231	43.53	16.242	69.46
29.2	9.00	78.78	42.500	31.70	55.092	43.99	16.009	69.68
Aug. 8.2	7.99	77.83	42.376	31.17	54.947	44.16	15.770	69.44
18.2	7.02	76.39	42.249	30.69	54.799	44.04	15.533	68.75
28.2	6.10	74.45	42.125	30.30	54.656	43.65	15.305	67.61
Sept. 7.1	5.26	72.07	42.012	30.02	54.525	42.96	15.096	66.04
17.1	4.51	69.30	41.917	29.85	54.413	41.97	14.911	64.06
27.1	3.89	66.16	41.849	29.83	54.326	40.68	14.761	61.71
Oct. 7.0	3.38	62.73	41.813	30.01	54.272	39.10	14.654	59.02
17.0	3.03	59.09	41.817	30.38	54.259	37.25	14.597	56.03
27.0	2.86	55.31	41.866	30.98	54.290	35.14	14.597	52.82
Nov. 6.0	2.86	51.47	41.963	31.82	54.369	32.81	14.657	49.43
15.9	3.05	47.66	42.108	32.92	54.498	30.29	14.781	45.95
25.9	3.41	43.98	42.301	34.24	54.677	27.65	14.969	42.47
Dec. 5.9	3.95	40.54	42.536	35.77	54.901	24.94	15.216	39.07
15.9	4.66	37.45	42.809	37.49	55.165	22.24	15.516	35.86
25.8	5.51	34.79	43.111	39.32	55.460	19.64	15.881	32.95
35.8	6.48	32.65	43.432	41.23	55.778	17.20	16.240	30.42
Mean Place	9.051	74.88	39.592	17.81	52.501	50.39	13.805	68.27
Sec δ, Tan δ	4.782	+4.677	1.005	-0.098	1.062	+0.356	1.452	+1.052
D <sub>α</sub> α, D <sub>α</sub> α	-0.01	+0.26	+0.06	-0.01	+0.06	+0.02	+0.05	+0.06
D <sub>δ</sub> δ, D <sub>δ</sub> δ	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5	-0.3	-0.5

## APPARENT PLACES OF STARS, 1917.

429

**FOR THE UPPER TRANSIT AT WASHINGTON.**

Washington Mean Time.	$\lambda$ Virginis. Mag. 4.6		$2$ Libræ. Mag. 6.3		$\theta$ Boëtis. Mag. 4.1		$f$ Boëtis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 14	" ' " -12 59	h m 14 18	" ' " -11 20	h m 14 22	" ' " +52 13	h m 14 22	" ' " +19 35
	s 14 14	" -12 59	s 14 18	" -11 20	s 14 22	" +52 13	s 14 22	" +19 35
Jan. 0.8	37.380	26.98	57.924	12.71	22.235	39.80	36.046	43.59
10.8	37.717 <sup>337</sup>	28.74 <sup>176</sup>	58.258 <sup>334</sup>	14.49 <sup>178</sup>	22.656 <sup>421</sup>	37.49 <sup>231</sup>	36.373 <sup>327</sup>	41.31 <sup>228</sup>
20.8	38.058 <sup>341</sup>	30.54 <sup>180</sup>	58.597 <sup>339</sup>	16.29 <sup>180</sup>	23.097 <sup>441</sup>	35.72 <sup>177</sup>	36.708 <sup>335</sup>	39.33 <sup>198</sup>
30.7	38.393 <sup>335</sup>	32.33 <sup>179</sup>	58.931 <sup>334</sup>	18.06 <sup>177</sup>	23.542 <sup>445</sup>	34.54 <sup>118</sup>	37.040 <sup>332</sup>	37.71 <sup>162</sup>
Feb. 9.7	38.713 <sup>320</sup>	34.03 <sup>170</sup>	59.251 <sup>320</sup>	19.73 <sup>167</sup>	23.976 <sup>434</sup>	34.01 <sup>53</sup>	37.361 <sup>321</sup>	36.50 <sup>121</sup>
	299	158	298	154	410	10	301	77
19.7	39.012	35.61	59.549	21.27	24.386	34.11	37.662	35.73
Mar. 1.7	39.285 <sup>273</sup>	37.03 <sup>142</sup>	59.823 <sup>274</sup>	22.63 <sup>136</sup>	24.762 <sup>376</sup>	34.84 <sup>73</sup>	37.938 <sup>276</sup>	35.42 <sup>31</sup>
11.6	39.527 <sup>242</sup>	38.26 <sup>123</sup>	60.067 <sup>244</sup>	23.77 <sup>114</sup>	25.092 <sup>330</sup>	36.14 <sup>130</sup>	38.183 <sup>245</sup>	35.55 <sup>13</sup>
21.6	39.737 <sup>210</sup>	39.29 <sup>103</sup>	60.280 <sup>213</sup>	24.71 <sup>94</sup>	25.370 <sup>278</sup>	37.95 <sup>181</sup>	38.395 <sup>212</sup>	36.09 <sup>54</sup>
31.6	39.917 <sup>180</sup>	40.11 <sup>82</sup>	60.462 <sup>182</sup>	25.43 <sup>72</sup>	25.594 <sup>224</sup>	40.19 <sup>224</sup>	38.573 <sup>178</sup>	36.99 <sup>90</sup>
	147	61	150	51	166	256	144	122
Apr. 10.5	40.064	40.72	60.612	25.94	25.760	42.75	38.717	38.21
20.5	40.180 <sup>116</sup>	41.16 <sup>44</sup>	60.732 <sup>120</sup>	26.27 <sup>33</sup>	25.867 <sup>107</sup>	45.52 <sup>277</sup>	38.825 <sup>108</sup>	39.66 <sup>145</sup>
30.5	40.268 <sup>88</sup>	41.41 <sup>25</sup>	60.823 <sup>91</sup>	26.41 <sup>14</sup>	25.916 <sup>49</sup>	48.39 <sup>287</sup>	38.901 <sup>76</sup>	41.28 <sup>162</sup>
May 10.5	40.326 <sup>58</sup>	41.52 <sup>11</sup>	60.884 <sup>61</sup>	26.42 <sup>1</sup>	25.910 <sup>6</sup>	51.26 <sup>287</sup>	38.946 <sup>45</sup>	42.99 <sup>171</sup>
20.4	40.356 <sup>30</sup>	41.49 <sup>3</sup>	60.918 <sup>34</sup>	26.30 <sup>12</sup>	25.853 <sup>57</sup>	54.04 <sup>278</sup>	38.960 <sup>14</sup>	44.74 <sup>175</sup>
	6	14	9	24	104	258	14	171
30.4	40.362	41.35	60.927	26.06	25.749	56.62	38.946	46.45
June 9.4	40.341 <sup>21</sup>	41.10 <sup>25</sup>	60.909 <sup>18</sup>	25.74 <sup>32</sup>	25.602 <sup>147</sup>	58.94 <sup>232</sup>	38.905 <sup>41</sup>	48.05 <sup>160</sup>
19.4	40.297 <sup>44</sup>	40.78 <sup>32</sup>	60.868 <sup>41</sup>	25.35 <sup>39</sup>	25.418 <sup>184</sup>	60.92 <sup>198</sup>	38.840 <sup>65</sup>	49.53 <sup>148</sup>
29.3	40.229 <sup>68</sup>	40.38 <sup>40</sup>	60.803 <sup>65</sup>	24.90 <sup>45</sup>	25.200 <sup>218</sup>	62.51 <sup>159</sup>	38.753 <sup>87</sup>	50.82 <sup>129</sup>
July 9.3	40.142 <sup>87</sup>	39.91 <sup>47</sup>	60.718 <sup>85</sup>	24.41 <sup>49</sup>	24.956 <sup>244</sup>	63.67 <sup>116</sup>	38.646 <sup>107</sup>	51.89 <sup>107</sup>
	106	52	103	53	265	70	125	84
19.3	40.036	39.39	60.615	23.88	24.691	64.37	38.521	52.73
29.2	39.917 <sup>119</sup>	38.84 <sup>55</sup>	60.497 <sup>118</sup>	23.31 <sup>57</sup>	24.412 <sup>279</sup>	64.60 <sup>23</sup>	38.384 <sup>137</sup>	53.29 <sup>56</sup>
Aug. 8.2	39.791 <sup>126</sup>	38.25 <sup>59</sup>	60.371 <sup>126</sup>	22.74 <sup>57</sup>	24.127 <sup>285</sup>	64.34 <sup>26</sup>	38.239 <sup>145</sup>	53.58 <sup>1</sup>
18.2	39.661 <sup>130</sup>	37.64 <sup>61</sup>	60.241 <sup>130</sup>	22.17 <sup>57</sup>	23.843 <sup>284</sup>	63.60 <sup>74</sup>	38.090 <sup>149</sup>	53.59 <sup>29</sup>
28.2	39.534 <sup>127</sup>	37.05 <sup>59</sup>	60.112 <sup>129</sup>	21.63 <sup>54</sup>	23.568 <sup>275</sup>	62.39 <sup>121</sup>	37.943 <sup>147</sup>	53.30 <sup>29</sup>
	116	56	117	49	256	166	136	59
Sept. 7.1	39.418	36.49	59.995	21.14	23.312	60.73	37.807	52.71
17.1	39.319 <sup>99</sup>	36.00 <sup>49</sup>	59.894 <sup>101</sup>	20.72 <sup>42</sup>	23.083 <sup>229</sup>	58.64 <sup>209</sup>	37.688 <sup>119</sup>	51.82 <sup>89</sup>
27.1	39.248 <sup>71</sup>	35.61 <sup>39</sup>	59.819 <sup>75</sup>	20.42 <sup>30</sup>	22.892 <sup>191</sup>	56.15 <sup>249</sup>	37.593 <sup>95</sup>	50.63 <sup>119</sup>
Oct. 7.1	39.211 <sup>37</sup>	35.37 <sup>24</sup>	59.778 <sup>41</sup>	20.27 <sup>15</sup>	22.747 <sup>145</sup>	53.32 <sup>283</sup>	37.531 <sup>62</sup>	49.15 <sup>148</sup>
17.0	39.214 <sup>3</sup>	35.29 <sup>8</sup>	59.775 <sup>3</sup>	20.28 <sup>1</sup>	22.657 <sup>90</sup>	50.18 <sup>314</sup>	37.508 <sup>23</sup>	47.38 <sup>177</sup>
	49	14	44	24	29	337	21	202
27.0	39.263	35.43	59.819	20.52	22.628	46.81	37.529	45.36
Nov. 6.0	39.360 <sup>97</sup>	35.79 <sup>36</sup>	59.913 <sup>94</sup>	20.98 <sup>46</sup>	22.667 <sup>39</sup>	43.26 <sup>355</sup>	37.599 <sup>70</sup>	43.11 <sup>225</sup>
15.9	39.509 <sup>149</sup>	36.42 <sup>63</sup>	60.055 <sup>142</sup>	21.69 <sup>71</sup>	22.776 <sup>109</sup>	39.63 <sup>363</sup>	37.719 <sup>120</sup>	40.67 <sup>244</sup>
25.9	39.706 <sup>197</sup>	37.29 <sup>87</sup>	60.246 <sup>191</sup>	22.65 <sup>96</sup>	22.955 <sup>179</sup>	36.00 <sup>363</sup>	37.888 <sup>169</sup>	38.08 <sup>259</sup>
Dec. 5.9	39.947 <sup>241</sup>	38.42 <sup>113</sup>	60.481 <sup>235</sup>	23.86 <sup>121</sup>	23.201 <sup>246</sup>	32.48 <sup>352</sup>	38.104 <sup>216</sup>	35.43 <sup>265</sup>
	278	135	274	141	308	333	257	266
15.9	40.225	39.77	60.755	25.27	23.509	29.15	38.361	32.77
25.8	40.534 <sup>309</sup>	41.32 <sup>155</sup>	61.059 <sup>304</sup>	26.86 <sup>159</sup>	23.869 <sup>360</sup>	26.15 <sup>300</sup>	38.651 <sup>290</sup>	30.21 <sup>256</sup>
35.8	40.861 <sup>327</sup>	43.01 <sup>169</sup>	61.383 <sup>324</sup>	28.57 <sup>171</sup>	24.270 <sup>401</sup>	23.55 <sup>260</sup>	38.966 <sup>315</sup>	27.80 <sup>241</sup>
Mean Place	36.912	22.71	57.478	7.90	22.329	62.20	35.703	58.11
Sec $\delta$ , Tan $\delta$	1.026	-0.231	1.020	-0.201	1.633	+1.290	1.061	+0.356
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.06	-0.01	+0.07	-0.01	+0.04	+0.07	+0.06	+0.02
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\phi$ Virginis. Mag. 5.0			$\epsilon$ Ursae Minoris. Mag. 4.4			$\rho$ Boötis. Mag. 3.8			$\gamma$ Boötis. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	14	23	- 1 51	14	27	+76 3	14	28	+30 43	14	28	+38 39
	s			s			s			s		
Jan. 0.8	55.873		30.98	38.93	29.25	205	15.423	49.25		44.314	55.50	
10.8	56.197	324	32.94	39.80	27.20	142	15.763	46.88	237	44.672	53.10	240
20.8	56.526	329	34.83	40.74	25.78	94	16.114	44.89	199	45.043	51.15	195
30.7	56.852	326	36.58	41.71	25.01	77	16.464	43.36	153	45.417	49.72	143
Feb. 9.7	57.165	313	38.12	42.67	24.91	10	16.805	42.34	102	45.781	48.85	87
		294				59			50			29
19.7	57.459		39.43	43.58	25.50		17.127	41.84		46.124	48.56	
Mar. 1.7	57.728	269	40.47	44.43	26.73	123	17.422	41.88	4	46.440	48.84	28
11.6	57.970	242	41.22	45.18	28.54	181	17.685	42.43	55	46.723	49.67	83
21.6	58.181	211	41.70	45.80	30.84	230	17.912	43.45	102	46.965	50.99	132
31.6	58.362	181	41.90	46.27	33.55	271	18.103	44.86	141	47.165	52.74	175
		149				299			175			209
Apr. 10.6	58.511		41.87	46.60	36.54		18.254	46.61		47.321	54.83	
20.5	58.629	118	41.61	46.77	39.70	316	18.366	48.60	199	47.434	57.16	233
30.5	58.719	90	41.18	46.76	42.90	320	18.441	50.77	217	47.505	59.64	248
May 10.5	58.780	61	40.62	46.61	46.04	314	18.480	53.00	223	47.534	62.17	253
20.4	58.812	32	39.95	46.32	49.00	296	18.486	55.22	222	47.525	64.66	249
		8				270			213			238
30.4	58.820		39.21	45.88	51.70		18.458	57.35		47.480	67.04	
June 9.4	58.802	18	38.45	45.33	54.06	236	18.400	59.34	199	47.401	69.22	218
19.4	58.762	40	37.67	44.68	56.00	194	18.315	61.12	178	47.291	71.14	192
29.3	58.697	65	36.92	43.95	57.47	147	18.205	62.64	152	47.155	72.75	161
July 9.3	58.614	83	36.21	43.15	58.44	97	18.073	63.86	122	46.994	74.02	127
		102				44			90			88
19.3	58.512		35.54	42.30	58.88		17.923	64.76		46.815	74.90	
29.3	58.395	117	34.95	41.43	58.79	9	17.758	65.30	54	46.621	75.39	49
Aug. 8.2	58.269	126	34.43	40.55	58.16	63	17.585	65.48	18	46.419	75.45	6
18.2	58.138	131	34.00	39.68	57.01	115	17.409	65.29	19	46.214	75.10	35
28.2	58.008	130	33.70	38.85	55.35	166	17.235	64.73	56	46.013	74.33	77
		120				212			93			119
Sept. 7.1	57.888		33.54	38.08	53.23		17.072	63.80		45.824	73.14	
17.1	57.784	104	33.51	37.37	50.68	255	16.927	62.50	130	45.656	71.56	158
27.1	57.705	79	33.67	36.76	47.74	294	16.809	60.85	165	45.515	69.60	196
Oct. 7.1	57.656	49	34.02	36.26	44.49	325	16.724	58.87	198	45.412	67.30	230
17.0	57.646	10	34.58	35.90	40.97	352	16.680	56.60	227	45.353	64.68	262
		34				371			255			287
27.0	57.680		35.38	35.67	37.26		16.684	54.05		45.344	61.81	
Nov. 6.0	57.763	83	36.41	35.60	33.45	381	16.739	51.28	277	45.391	58.71	310
16.0	57.893	130	37.69	35.69	29.62	383	16.847	48.34	294	45.495	55.48	323
25.9	58.071	178	39.17	35.94	25.88	374	17.009	45.30	304	45.657	52.18	330
Dec. 5.9	58.294	223	40.85	36.35	22.33	355	17.222	42.26	213	45.875	48.90	328
		261				326			259			316
15.9	58.555		42.68	36.93	19.07		17.481	39.27		46.142	45.74	
25.8	58.846	291	44.60	37.62	16.21	286	17.777	36.45	282	46.450	42.80	294
35.8	59.160	314	46.55	38.43	13.83	238	18.101	33.89	256	46.792	40.18	263
Mean Place	55.458		23.14	40.979	54.14		15.208	66.73		44.200	74.90	
Sec $\delta$ , Tan $\delta$	1.001		-0.032	4.151	+4.029		1.163	+0.594		1.281	+0.800	
$D\psi a$ , $D_{\omega} a$	+0.06		0.00	0.00	+0.22		+0.05	+0.03		+0.05	+0.04	
$n\psi \delta$ , $D_{\omega} \delta$	-0.3		-0.6	-0.3	-0.6		-0.3	-0.6		-0.3	-0.6	



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Centauri. Mag. 2.6		$\sigma$ Boötis. Mag. 4.5		$\alpha^2$ Centauri. Mag. 0.3		33 Boötis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 30 s	" ' " -41 47 "	h m 14 31 s	" ' " +30 5 "	h m 14 33 s	" ' " -60 29 "	h m 14 35 s	" ' " +44 45 "
Jan. 0.8	14.096	33.90	4.237	61.38	57.69	22.64	44.916	23.09
10.8	14.514 <sup>418</sup>	34.75 <sup>85</sup>	4.574 <sup>337</sup>	58.99 <sup>239</sup>	58.27 <sup>58</sup>	22.93 <sup>29</sup>	45.290 <sup>374</sup>	20.64 <sup>245</sup>
20.8	14.939 <sup>425</sup>	35.93 <sup>118</sup>	4.923 <sup>349</sup>	56.99 <sup>200</sup>	58.86 <sup>59</sup>	23.70 <sup>77</sup>	45.681 <sup>391</sup>	18.67 <sup>197</sup>
30.7	15.360 <sup>41</sup>	37.39 <sup>146</sup>	5.273 <sup>350</sup>	55.44 <sup>155</sup>	59.45 <sup>59</sup>	24.91 <sup>121</sup>	46.079 <sup>398</sup>	17.26 <sup>141</sup>
Feb. 9.7	15.766 <sup>406</sup>	39.10 <sup>171</sup>	5.614 <sup>341</sup>	54.38 <sup>106</sup>	60.01 <sup>56</sup>	26.52 <sup>161</sup>	46.469 <sup>390</sup>	16.44 <sup>82</sup>
19.7	16.151 <sup>385</sup>	40.99 <sup>189</sup>	5.936 <sup>322</sup>	53.85 <sup>53</sup>	60.55 <sup>54</sup>	28.48 <sup>196</sup>	46.841 <sup>372</sup>	16.24 <sup>20</sup>
Mar. 1.7	16.506 <sup>355</sup>	43.01 <sup>202</sup>	6.232 <sup>296</sup>	53.86 <sup>1</sup>	61.04 <sup>49</sup>	30.73 <sup>225</sup>	47.184 <sup>343</sup>	16.64 <sup>40</sup>
11.6	16.828 <sup>322</sup>	45.11 <sup>210</sup>	6.497 <sup>265</sup>	54.36 <sup>50</sup>	61.49 <sup>45</sup>	33.21 <sup>248</sup>	47.491 <sup>307</sup>	17.62 <sup>98</sup>
21.6	17.113 <sup>285</sup>	47.24 <sup>213</sup>	6.728 <sup>231</sup>	55.33 <sup>97</sup>	61.88 <sup>39</sup>	35.86 <sup>265</sup>	47.757 <sup>266</sup>	19.12 <sup>150</sup>
31.6	17.360 <sup>247</sup>	49.35 <sup>211</sup>	6.920 <sup>192</sup>	56.71 <sup>138</sup>	62.21 <sup>33</sup>	38.61 <sup>275</sup>	47.976 <sup>219</sup>	21.04 <sup>192</sup>
Apr. 10.6	17.569 <sup>200</sup>	51.43 <sup>208</sup>	7.074 <sup>154</sup>	58.43 <sup>172</sup>	62.48 <sup>27</sup>	41.41 <sup>280</sup>	48.148 <sup>172</sup>	23.32 <sup>228</sup>
20.5	17.739 <sup>170</sup>	53.42 <sup>199</sup>	7.190 <sup>116</sup>	60.39 <sup>196</sup>	62.69 <sup>21</sup>	44.20 <sup>279</sup>	48.271 <sup>123</sup>	25.87 <sup>255</sup>
30.5	17.870 <sup>131</sup>	55.31 <sup>189</sup>	7.269 <sup>79</sup>	62.54 <sup>215</sup>	62.84 <sup>15</sup>	46.93 <sup>273</sup>	48.347 <sup>76</sup>	28.56 <sup>269</sup>
May 10.5	17.963 <sup>93</sup>	57.07 <sup>176</sup>	7.313 <sup>44</sup>	64.75 <sup>221</sup>	62.93 <sup>9</sup>	49.55 <sup>262</sup>	48.375 <sup>28</sup>	31.30 <sup>274</sup>
20.4	18.017 <sup>54</sup>	58.66 <sup>159</sup>	7.322 <sup>9</sup>	66.96 <sup>221</sup>	62.96 <sup>3</sup>	52.01 <sup>246</sup>	48.359 <sup>16</sup>	34.00 <sup>270</sup>
30.4	18.033 <sup>16</sup>	60.07 <sup>141</sup>	7.298 <sup>24</sup>	69.09 <sup>213</sup>	62.93 <sup>3</sup>	54.25 <sup>224</sup>	48.302 <sup>57</sup>	36.55 <sup>255</sup>
June 9.4	18.011 <sup>22</sup>	61.25 <sup>118</sup>	7.245 <sup>53</sup>	71.09 <sup>200</sup>	62.84 <sup>9</sup>	56.22 <sup>197</sup>	48.208 <sup>94</sup>	38.90 <sup>235</sup>
19.4	17.954 <sup>57</sup>	62.21 <sup>96</sup>	7.164 <sup>81</sup>	72.88 <sup>179</sup>	62.69 <sup>15</sup>	57.89 <sup>167</sup>	48.078 <sup>130</sup>	40.95 <sup>205</sup>
29.3	17.864 <sup>90</sup>	62.91 <sup>70</sup>	7.057 <sup>107</sup>	74.40 <sup>152</sup>	62.48 <sup>21</sup>	59.21 <sup>132</sup>	47.917 <sup>161</sup>	42.68 <sup>173</sup>
July 9.3	17.741 <sup>123</sup>	63.33 <sup>42</sup>	6.929 <sup>128</sup>	75.64 <sup>124</sup>	62.24 <sup>24</sup>	60.15 <sup>94</sup>	47.731 <sup>186</sup>	44.02 <sup>134</sup>
19.3	17.593 <sup>148</sup>	63.45 <sup>12</sup>	6.782 <sup>147</sup>	76.57 <sup>93</sup>	61.95 <sup>29</sup>	60.68 <sup>53</sup>	47.521 <sup>210</sup>	44.95 <sup>93</sup>
29.3	17.422 <sup>171</sup>	63.27 <sup>18</sup>	6.619 <sup>163</sup>	77.14 <sup>57</sup>	61.64 <sup>31</sup>	60.77 <sup>9</sup>	47.297 <sup>224</sup>	45.44 <sup>49</sup>
Aug. 8.2	17.237 <sup>185</sup>	62.81 <sup>46</sup>	6.448 <sup>171</sup>	77.34 <sup>20</sup>	61.31 <sup>33</sup>	60.43 <sup>34</sup>	47.062 <sup>235</sup>	45.48 <sup>4</sup>
18.2	17.046 <sup>191</sup>	62.05 <sup>76</sup>	6.273 <sup>175</sup>	77.18 <sup>16</sup>	60.98 <sup>33</sup>	59.66 <sup>77</sup>	46.824 <sup>238</sup>	45.06 <sup>42</sup>
28.2	16.858 <sup>188</sup>	61.03 <sup>102</sup>	6.101 <sup>172</sup>	76.67 <sup>51</sup>	60.65 <sup>33</sup>	58.47 <sup>119</sup>	46.590 <sup>234</sup>	44.20 <sup>86</sup>
Sept. 7.1	16.682 <sup>176</sup>	59.76 <sup>127</sup>	5.939 <sup>162</sup>	75.78 <sup>89</sup>	60.35 <sup>30</sup>	56.89 <sup>158</sup>	46.368 <sup>222</sup>	42.88 <sup>132</sup>
17.1	16.531 <sup>151</sup>	58.32 <sup>144</sup>	5.794 <sup>145</sup>	74.52 <sup>126</sup>	60.10 <sup>25</sup>	55.00 <sup>189</sup>	46.168 <sup>200</sup>	41.15 <sup>173</sup>
27.1	16.415 <sup>116</sup>	56.74 <sup>158</sup>	5.675 <sup>119</sup>	72.91 <sup>161</sup>	59.89 <sup>21</sup>	52.84 <sup>216</sup>	45.998 <sup>170</sup>	39.03 <sup>212</sup>
Oct. 7.1	16.342 <sup>73</sup>	55.08 <sup>166</sup>	5.589 <sup>86</sup>	70.98 <sup>193</sup>	59.75 <sup>14</sup>	50.50 <sup>234</sup>	45.866 <sup>132</sup>	36.53 <sup>250</sup>
17.0	16.323 <sup>19</sup>	53.46 <sup>162</sup>	5.544 <sup>45</sup>	68.74 <sup>224</sup>	59.70 <sup>5</sup>	48.07 <sup>243</sup>	45.783 <sup>83</sup>	33.73 <sup>280</sup>
27.0	16.365 <sup>42</sup>	51.90 <sup>156</sup>	5.545 <sup>1</sup>	66.22 <sup>252</sup>	59.73 <sup>3</sup>	45.65 <sup>242</sup>	45.752 <sup>31</sup>	30.64 <sup>309</sup>
Nov. 6.0	16.469 <sup>104</sup>	50.50 <sup>140</sup>	5.597 <sup>52</sup>	63.49 <sup>273</sup>	59.85 <sup>12</sup>	43.33 <sup>232</sup>	45.781 <sup>29</sup>	27.35 <sup>329</sup>
16.0	16.638 <sup>169</sup>	49.35 <sup>115</sup>	5.703 <sup>106</sup>	60.59 <sup>290</sup>	60.08 <sup>32</sup>	41.23 <sup>210</sup>	45.873 <sup>92</sup>	23.93 <sup>342</sup>
25.9	16.871 <sup>233</sup>	48.47 <sup>88</sup>	5.863 <sup>160</sup>	57.58 <sup>301</sup>	60.40 <sup>23</sup>	39.43 <sup>180</sup>	46.027 <sup>154</sup>	20.45 <sup>348</sup>
Dec. 5.9	17.160 <sup>289</sup>	47.95 <sup>52</sup>	6.073 <sup>210</sup>	54.55 <sup>303</sup>	60.79 <sup>39</sup>	37.99 <sup>144</sup>	46.241 <sup>214</sup>	17.02 <sup>343</sup>
15.9	17.499 <sup>339</sup>	47.80 <sup>15</sup>	6.328 <sup>255</sup>	51.58 <sup>297</sup>	61.25 <sup>46</sup>	36.99 <sup>100</sup>	46.511 <sup>270</sup>	13.73 <sup>329</sup>
25.8	17.875 <sup>376</sup>	48.03 <sup>23</sup>	6.622 <sup>294</sup>	48.77 <sup>281</sup>	61.77 <sup>52</sup>	36.46 <sup>53</sup>	46.828 <sup>317</sup>	10.70 <sup>303</sup>
35.8	18.280 <sup>405</sup>	48.63 <sup>60</sup>	6.944 <sup>322</sup>	46.20 <sup>257</sup>	62.33 <sup>56</sup>	36.42 <sup>4</sup>	47.184 <sup>356</sup>	8.00 <sup>270</sup>
Mean Place	13.824	37.92	4.036	78.60	57.052	36.71	44.969	43.53
Sec $\delta$ , Tan $\delta$	1.341	-0.894	1.156	+0.580	2.030	-1.767	1.408	+0.992
$D\psi\alpha$ , $D_m\alpha$	+0.08	-0.05	+0.05	+0.03	+0.09	-0.09	+0.04	+0.05
$D\psi\delta$ , $D_m\delta$	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Apodis. Mag. 3.8		$\mu$ Virginis. Mag. 4.0		$\epsilon$ Boötis. Mag. 2.7		109 Virginis. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 37	° ' -78 41	h m 14 38	° ' - 5 17	h m 14 41	° ' +27 24	h m 14 42	° ' + 2 14
	s "	"	s "	"	s "	"	s "	"
Jan. 0.8	27.24	27.21	41.395	59.48	21.891	68.35	3.397	22.19
10.8	28.55	26.81	41.717	61.33	22.218	65.93	3.713	20.18
20.8	29.91	26.98	42.047	63.15	22.558	63.87	4.038	18.27
30.8	31.28	27.71	42.375	64.87	22.901	62.23	4.362	16.55
Feb. 9.7	32.62	28.96	42.694	66.43	23.236	61.06	4.678	15.06
19.7	33.90	30.69	42.995	67.79	23.556	60.40	4.976	13.86
Mar. 1.7	35.11	32.86	43.275	68.91	23.852	60.26	5.254	12.96
11.6	36.20	35.39	43.528	69.79	24.119	60.62	5.506	12.39
21.6	37.18	38.22	43.753	70.39	24.354	61.44	5.729	12.13
31.6	38.02	41.29	43.948	70.76	24.553	62.68	5.924	12.16
Apr. 10.6	38.71	44.52	44.113	70.88	24.716	64.26	6.087	12.47
20.5	39.25	47.85	44.249	70.80	24.842	66.10	6.222	12.99
30.5	39.63	51.21	44.355	70.55	24.934	68.13	6.327	13.71
May 10.5	39.83	54.52	44.433	70.16	24.990	70.26	6.403	14.55
20.4	39.88	57.72	44.484	69.67	25.012	72.41	6.451	15.48
30.4	39.76	60.72	44.506	69.09	25.002	74.50	6.471	16.46
June 9.4	39.46	63.48	44.503	68.47	24.963	76.47	6.465	17.46
19.4	39.03	65.91	44.472	67.82	24.895	78.27	6.432	18.43
29.3	38.46	67.96	44.418	67.17	24.801	79.83	6.376	19.35
July 9.3	37.76	69.57	44.340	66.53	24.682	81.11	6.295	20.19
19.3	36.95	70.70	44.243	65.91	24.544	82.11	6.196	20.94
29.3	36.08	71.32	44.128	65.33	24.390	82.78	6.078	21.58
Aug. 8.2	35.16	71.40	44.001	64.80	24.223	83.10	5.949	22.10
18.2	34.23	70.92	43.867	64.34	24.052	83.08	5.812	22.48
28.2	33.33	69.92	43.732	63.96	23.881	82.70	5.674	22.70
Sept. 7.1	32.49	68.41	43.604	63.68	23.718	81.96	5.543	22.76
17.1	31.76	66.43	43.492	63.52	23.570	80.87	5.426	22.64
27.1	31.15	64.08	43.401	63.51	23.447	79.44	5.330	22.31
Oct. 7.1	30.71	61.38	43.341	63.68	23.354	77.67	5.264	21.77
17.0	30.48	58.49	43.320	64.03	23.301	75.59	5.236	21.00
27.0	30.45	55.50	43.342	64.59	23.293	73.24	5.250	20.01
Nov. 6.0	30.64	52.52	43.411	65.40	23.335	70.65	5.311	18.76
16.0	31.06	49.68	43.530	66.43	23.431	67.88	5.422	17.30
25.9	31.70	47.09	43.698	67.69	23.579	64.98	5.581	15.62
Dec. 5.9	32.55	44.84	43.912	69.15	23.777	62.03	5.785	13.78
15.9	33.56	43.03	44.166	70.79	24.021	59.11	6.030	11.82
25.8	34.72	41.72	44.452	72.54	24.302	56.31	6.308	9.79
35.8	35.98	40.96	44.762	74.37	24.615	53.74	6.611	7.75
Mean Place	28.968	37.47	41.050	52.80	21.734	84.57	3.086	31.17
Sec $\delta$ , Tan $\delta$	5.102	-5.002	1.004	-0.093	1.127	+0.519	1.001	+0.039
$D\psi\alpha$ , $D\omega\alpha$	+0.14	-0.26	+0.06	0.00	+0.05	+0.03	+0.06	0.00
$D\psi\delta$ , $D\omega\delta$	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6	-0.3	-0.6

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Libræ. Mag. 5.3		$\alpha$ Libræ. Mag. 2.9		Groombridge 2164. Mag. 5.7		$\beta$ Ursæ Minoris. Mag. 2.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 46	° ' -15 39	h m 14 46	° ' -15 41	h m 14 49	° ' +59 37	h m 14 50	° ' +74 29
	s "	s "	s "	s "	s "	s "	s "	s "
Jan. 0.8	5.873	13.55	17.320	54.70	19.213	28.90	53.71	17.20
10.8	6.204 <sup>331</sup>	15.08 <sup>153</sup>	17.651 <sup>331</sup>	56.23 <sup>153</sup>	19.670 <sup>457</sup>	26.40 <sup>250</sup>	54.46 <sup>75</sup>	14.88 <sup>232</sup>
20.8	6.545 <sup>341</sup>	16.68 <sup>160</sup>	17.992 <sup>341</sup>	57.83 <sup>160</sup>	20.161 <sup>491</sup>	24.45 <sup>195</sup>	55.28 <sup>82</sup>	13.13 <sup>175</sup>
30.8	6.886 <sup>341</sup>	18.30 <sup>162</sup>	18.332 <sup>340</sup>	59.45 <sup>162</sup>	20.668 <sup>507</sup>	23.13 <sup>132</sup>	56.14 <sup>86</sup>	12.02 <sup>111</sup>
Feb. 9.7	7.217 <sup>331</sup>	19.88 <sup>158</sup>	18.663 <sup>331</sup>	61.03 <sup>158</sup>	21.176 <sup>508</sup>	22.45 <sup>68</sup>	57.02 <sup>88</sup>	11.60 <sup>42</sup>
19.7	7.532 <sup>315</sup>	21.37 <sup>149</sup>	18.978 <sup>315</sup>	62.52 <sup>149</sup>	21.666 <sup>490</sup>	22.45 <sup>0</sup>	57.87 <sup>85</sup>	11.86 <sup>26</sup>
Mar. 1.7	7.824 <sup>292</sup>	22.73 <sup>136</sup>	19.270 <sup>292</sup>	63.88 <sup>136</sup>	22.125 <sup>459</sup>	23.10 <sup>65</sup>	58.67 <sup>80</sup>	12.79 <sup>98</sup>
11.6	8.091 <sup>267</sup>	23.93 <sup>120</sup>	19.537 <sup>267</sup>	65.08 <sup>120</sup>	22.540 <sup>415</sup>	24.37 <sup>127</sup>	59.40 <sup>73</sup>	14.33 <sup>154</sup>
21.6	8.331 <sup>240</sup>	24.96 <sup>108</sup>	19.777 <sup>240</sup>	66.11 <sup>108</sup>	22.900 <sup>380</sup>	26.20 <sup>183</sup>	60.02 <sup>62</sup>	16.41 <sup>206</sup>
31.6	8.541 <sup>210</sup>	25.81 <sup>85</sup>	19.987 <sup>210</sup>	66.96 <sup>85</sup>	23.198 <sup>298</sup>	28.50 <sup>230</sup>	60.53 <sup>51</sup>	18.94 <sup>258</sup>
Apr. 10.6	8.722 <sup>181</sup>	26.48 <sup>67</sup>	20.169 <sup>182</sup>	67.62 <sup>66</sup>	23.427 <sup>229</sup>	31.17 <sup>267</sup>	60.90 <sup>37</sup>	21.81 <sup>287</sup>
20.5	8.872 <sup>150</sup>	26.98 <sup>50</sup>	20.319 <sup>150</sup>	68.12 <sup>50</sup>	23.586 <sup>189</sup>	34.09 <sup>292</sup>	61.13 <sup>23</sup>	24.92 <sup>311</sup>
30.5	8.993 <sup>121</sup>	27.32 <sup>34</sup>	20.441 <sup>122</sup>	68.47 <sup>35</sup>	23.674 <sup>88</sup>	37.17 <sup>308</sup>	61.23 <sup>10</sup>	28.13 <sup>321</sup>
May 10.5	9.085 <sup>92</sup>	27.51 <sup>19</sup>	20.533 <sup>92</sup>	68.67 <sup>20</sup>	23.692 <sup>18</sup>	40.29 <sup>312</sup>	61.17 <sup>6</sup>	31.35 <sup>322</sup>
20.5	9.147 <sup>62</sup>	27.59 <sup>8</sup>	20.596 <sup>63</sup>	68.75 <sup>8</sup>	23.643 <sup>49</sup>	43.32 <sup>303</sup>	60.99 <sup>18</sup>	34.44 <sup>309</sup>
30.4	9.180 <sup>33</sup>	27.57 <sup>2</sup>	20.629 <sup>33</sup>	68.73 <sup>2</sup>	23.531 <sup>112</sup>	46.19 <sup>287</sup>	60.68 <sup>31</sup>	37.33 <sup>289</sup>
June 9.4	9.186 <sup>6</sup>	27.45 <sup>12</sup>	20.635 <sup>6</sup>	68.61 <sup>12</sup>	23.531 <sup>171</sup>	46.19 <sup>260</sup>	60.68 <sup>43</sup>	37.33 <sup>259</sup>
19.4	9.162 <sup>24</sup>	27.23 <sup>22</sup>	20.612 <sup>23</sup>	68.40 <sup>21</sup>	23.360 <sup>224</sup>	48.79 <sup>230</sup>	60.25 <sup>53</sup>	39.92 <sup>222</sup>
29.3	9.113 <sup>49</sup>	26.95 <sup>28</sup>	20.563 <sup>49</sup>	68.12 <sup>28</sup>	23.136 <sup>269</sup>	51.09 <sup>190</sup>	59.72 <sup>63</sup>	42.14 <sup>179</sup>
July 9.3	9.038 <sup>75</sup>	26.59 <sup>36</sup>	20.488 <sup>75</sup>	67.77 <sup>35</sup>	22.867 <sup>309</sup>	52.99 <sup>145</sup>	59.09 <sup>68</sup>	43.93 <sup>131</sup>
19.3	8.941 <sup>97</sup>	26.18 <sup>41</sup>	20.390 <sup>98</sup>	67.36 <sup>41</sup>	22.558 <sup>340</sup>	54.44 <sup>98</sup>	58.41 <sup>74</sup>	45.24 <sup>81</sup>
29.3	8.824 <sup>117</sup>	25.71 <sup>47</sup>	20.273 <sup>117</sup>	66.89 <sup>47</sup>	22.218 <sup>363</sup>	55.42 <sup>49</sup>	57.67 <sup>78</sup>	46.05 <sup>29</sup>
Aug. 8.2	8.693 <sup>131</sup>	25.19 <sup>52</sup>	20.142 <sup>131</sup>	66.37 <sup>52</sup>	21.855 <sup>377</sup>	55.91 <sup>3</sup>	56.89 <sup>80</sup>	46.34 <sup>25</sup>
18.2	8.554 <sup>139</sup>	24.64 <sup>55</sup>	20.002 <sup>140</sup>	65.81 <sup>56</sup>	21.478 <sup>377</sup>	55.88 <sup>53</sup>	56.09 <sup>80</sup>	46.09 <sup>79</sup>
28.2	8.412 <sup>142</sup>	24.07 <sup>57</sup>	19.860 <sup>142</sup>	65.24 <sup>57</sup>	21.097 <sup>381</sup>	55.35 <sup>53</sup>	55.29 <sup>80</sup>	45.30 <sup>129</sup>
Sept. 7.2	8.277 <sup>135</sup>	23.50 <sup>57</sup>	19.724 <sup>136</sup>	64.67 <sup>57</sup>	20.721 <sup>376</sup>	54.31 <sup>104</sup>	54.50 <sup>79</sup>	44.01 <sup>178</sup>
17.1	8.157 <sup>120</sup>	22.96 <sup>54</sup>	19.604 <sup>120</sup>	64.12 <sup>55</sup>	20.363 <sup>358</sup>	52.79 <sup>152</sup>	53.75 <sup>75</sup>	42.23 <sup>178</sup>
27.1	8.058 <sup>66</sup>	22.48 <sup>48</sup>	19.505 <sup>99</sup>	63.64 <sup>48</sup>	20.032 <sup>331</sup>	50.80 <sup>199</sup>	53.06 <sup>69</sup>	39.98 <sup>225</sup>
Oct. 7.1	7.992 <sup>26</sup>	22.11 <sup>37</sup>	19.439 <sup>66</sup>	63.26 <sup>38</sup>	19.741 <sup>291</sup>	48.38 <sup>242</sup>	52.46 <sup>60</sup>	37.32 <sup>266</sup>
17.0	7.966 <sup>26</sup>	21.87 <sup>24</sup>	19.412 <sup>27</sup>	63.01 <sup>25</sup>	19.500 <sup>241</sup>	45.59 <sup>279</sup>	51.93 <sup>53</sup>	34.29 <sup>303</sup>
27.0	7.984 <sup>18</sup>	21.80 <sup>7</sup>	19.430 <sup>18</sup>	62.95 <sup>6</sup>	19.321 <sup>179</sup>	42.46 <sup>313</sup>	51.52 <sup>41</sup>	30.96 <sup>333</sup>
Nov. 6.0	7.984 <sup>67</sup>	21.80 <sup>14</sup>	19.430 <sup>68</sup>	62.95 <sup>14</sup>	19.211 <sup>30</sup>	39.06 <sup>361</sup>	51.23 <sup>15</sup>	27.38 <sup>374</sup>
16.0	8.051 <sup>119</sup>	21.94 <sup>36</sup>	19.498 <sup>119</sup>	63.09 <sup>35</sup>	19.181 <sup>53</sup>	35.45 <sup>372</sup>	51.08 <sup>0</sup>	23.64 <sup>381</sup>
25.9	8.170 <sup>170</sup>	22.30 <sup>61</sup>	19.617 <sup>170</sup>	63.44 <sup>61</sup>	19.234 <sup>137</sup>	31.73 <sup>375</sup>	51.08 <sup>15</sup>	19.83 <sup>378</sup>
Dec. 5.9	8.340 <sup>218</sup>	22.91 <sup>85</sup>	19.787 <sup>218</sup>	64.05 <sup>85</sup>	19.371 <sup>220</sup>	27.98 <sup>367</sup>	51.23 <sup>31</sup>	16.05 <sup>367</sup>
15.9	8.558 <sup>260</sup>	23.76 <sup>108</sup>	20.005 <sup>260</sup>	64.90 <sup>108</sup>	19.591 <sup>298</sup>	24.31 <sup>347</sup>	51.54 <sup>44</sup>	12.38 <sup>342</sup>
25.9	8.818 <sup>294</sup>	24.84 <sup>127</sup>	20.265 <sup>294</sup>	65.98 <sup>127</sup>	19.889 <sup>367</sup>	20.84 <sup>317</sup>	51.98 <sup>57</sup>	8.96 <sup>308</sup>
35.8	9.112 <sup>318</sup>	26.11 <sup>144</sup>	20.559 <sup>318</sup>	67.25 <sup>143</sup>	20.256 <sup>427</sup>	17.67 <sup>278</sup>	52.55 <sup>69</sup>	5.88 <sup>308</sup>
Mean Place	5.561	10.04	17.008	51.20	19.924	51.22	56.060	40.81
Sec $\delta$ , Tan $\delta$	1.039	-0.280	1.039	-0.281	1.978	+1.706	3.740	+3.603
$D\psi$ $\alpha$ , $D\omega$ $\alpha$	+0.07	-0.01	+0.07	-0.01	+0.03	+0.08	0.00	+0.18
$D\psi$ $\delta$ , $D\omega$ $\delta$	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\xi^2$ Libræ. Mag. 5.6		Piazzi 231. Mag. 5.8		$\beta$ Lupi. Mag. 2.8		$\delta$ Libræ. Var. 4.8-6.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 52	° ' -11 4	h m 14 52	° ' +14 46	h m 14 53	° ' -42 47	h m 14 56	° ' - 8 11
	s	"	s	"	s	"	s	"
Jan. 0.8	15.964	36.40	18.289	39.34	5.324	58.27	32.355	30.86
10.8	16.287 <sup>323</sup>	38.03 <sup>163</sup>	18.600 <sup>311</sup>	37.06 <sup>228</sup>	5.739 <sup>415</sup>	58.84 <sup>57</sup>	32.672 <sup>317</sup>	32.56 <sup>170</sup>
20.8	16.620 <sup>333</sup>	39.69 <sup>166</sup>	18.924 <sup>324</sup>	35.03 <sup>203</sup>	6.167 <sup>428</sup>	59.73 <sup>89</sup>	33.001 <sup>329</sup>	34.24 <sup>168</sup>
30.8	16.954 <sup>334</sup>	41.31 <sup>162</sup>	19.250 <sup>326</sup>	33.30 <sup>173</sup>	6.596 <sup>429</sup>	60.92 <sup>119</sup>	33.332 <sup>331</sup>	35.88 <sup>164</sup>
Feb. 9.7	17.280 <sup>326</sup>	42.85 <sup>154</sup>	19.570 <sup>320</sup>	31.91 <sup>139</sup>	7.016 <sup>420</sup>	62.36 <sup>144</sup>	33.655 <sup>323</sup>	37.40 <sup>152</sup>
	311	140	305	97	401	165	308	135
19.7	17.591	44.25	19.875	30.94	7.417	64.01	33.963	38.75
Mar. 1.7	17.882 <sup>291</sup>	45.47 <sup>122</sup>	20.161 <sup>286</sup>	30.40 <sup>54</sup>	7.794 <sup>377</sup>	65.81 <sup>180</sup>	34.253 <sup>290</sup>	39.88 <sup>113</sup>
11.7	18.147 <sup>265</sup>	46.50 <sup>103</sup>	20.421 <sup>260</sup>	30.27 <sup>13</sup>	8.141 <sup>347</sup>	67.71 <sup>190</sup>	34.518 <sup>265</sup>	40.80 <sup>92</sup>
21.6	18.387 <sup>240</sup>	47.32 <sup>82</sup>	20.654 <sup>233</sup>	30.55 <sup>28</sup>	8.455 <sup>314</sup>	69.68 <sup>197</sup>	34.759 <sup>241</sup>	41.48 <sup>68</sup>
31.6	18.598 <sup>211</sup>	47.91 <sup>59</sup>	20.856 <sup>202</sup>	31.20 <sup>65</sup>	8.734 <sup>279</sup>	71.67 <sup>199</sup>	34.971 <sup>212</sup>	41.93 <sup>45</sup>
	182	40	170	96	240	198	183	22
Apr. 10.6	18.780	48.31	21.026	32.16	8.974	73.65	35.154	42.15
20.5	18.932 <sup>152</sup>	48.52 <sup>21</sup>	21.167 <sup>141</sup>	33.39 <sup>123</sup>	9.177 <sup>203</sup>	75.58 <sup>193</sup>	35.308 <sup>154</sup>	42.19 <sup>4</sup>
30.5	19.056 <sup>124</sup>	48.57 <sup>5</sup>	21.275 <sup>108</sup>	34.81 <sup>142</sup>	9.341 <sup>164</sup>	77.44 <sup>186</sup>	35.433 <sup>125</sup>	42.06 <sup>13</sup>
May 10.5	19.151 <sup>95</sup>	48.48 <sup>9</sup>	21.352 <sup>77</sup>	36.36 <sup>155</sup>	9.466 <sup>125</sup>	79.20 <sup>176</sup>	35.530 <sup>97</sup>	41.78 <sup>28</sup>
20.5	19.217 <sup>66</sup>	48.27 <sup>21</sup>	21.400 <sup>48</sup>	37.98 <sup>162</sup>	9.550 <sup>84</sup>	80.83 <sup>163</sup>	35.598 <sup>68</sup>	41.40 <sup>38</sup>
	38	29	17	163	45	148	41	46
30.4	19.255	47.98	21.417	39.61	9.595	82.31	35.639	40.94
June 9.4	19.263 <sup>8</sup>	47.61 <sup>37</sup>	21.406 <sup>11</sup>	41.18 <sup>157</sup>	9.599 <sup>4</sup>	83.61 <sup>130</sup>	35.650 <sup>11</sup>	40.42 <sup>52</sup>
19.4	19.244 <sup>19</sup>	47.19 <sup>42</sup>	21.368 <sup>38</sup>	42.65 <sup>147</sup>	9.563 <sup>36</sup>	84.70 <sup>109</sup>	35.633 <sup>17</sup>	39.86 <sup>56</sup>
29.4	19.199 <sup>45</sup>	46.73 <sup>46</sup>	21.303 <sup>65</sup>	43.99 <sup>134</sup>	9.489 <sup>74</sup>	85.56 <sup>86</sup>	35.590 <sup>43</sup>	39.28 <sup>58</sup>
July 9.3	19.128 <sup>71</sup>	46.23 <sup>50</sup>	21.214 <sup>89</sup>	45.15 <sup>116</sup>	9.380 <sup>109</sup>	86.14 <sup>58</sup>	35.520 <sup>70</sup>	38.70 <sup>58</sup>
	93	51	111	96	141	31	92	58
19.3	19.035	45.72	21.103	46.11	9.239	86.45	35.428	38.12
29.3	18.921 <sup>114</sup>	45.20 <sup>52</sup>	20.975 <sup>128</sup>	46.85 <sup>74</sup>	9.071 <sup>168</sup>	86.48 <sup>3</sup>	35.315 <sup>113</sup>	37.57 <sup>55</sup>
Aug. 8.2	18.793 <sup>128</sup>	44.68 <sup>52</sup>	20.834 <sup>141</sup>	47.35 <sup>50</sup>	8.884 <sup>187</sup>	86.21 <sup>27</sup>	35.188 <sup>127</sup>	37.04 <sup>53</sup>
18.2	18.656 <sup>137</sup>	44.16 <sup>52</sup>	20.684 <sup>150</sup>	47.59 <sup>24</sup>	8.686 <sup>198</sup>	85.64 <sup>57</sup>	35.051 <sup>137</sup>	36.55 <sup>49</sup>
28.2	18.516 <sup>140</sup>	43.68 <sup>48</sup>	20.532 <sup>152</sup>	47.58 <sup>1</sup>	8.485 <sup>201</sup>	84.79 <sup>85</sup>	34.910 <sup>141</sup>	36.12 <sup>43</sup>
	136	44	147	29	193	111	136	36
Sept. 7.2	18.380	43.24	20.385	47.29	8.292	83.68	34.774	35.76
17.1	18.258 <sup>122</sup>	42.87 <sup>37</sup>	20.250 <sup>135</sup>	46.71 <sup>58</sup>	8.119 <sup>173</sup>	82.36 <sup>132</sup>	34.650 <sup>124</sup>	35.50 <sup>26</sup>
27.1	18.156 <sup>102</sup>	42.60 <sup>27</sup>	20.138 <sup>112</sup>	45.88 <sup>83</sup>	7.976 <sup>143</sup>	80.88 <sup>148</sup>	34.545 <sup>105</sup>	35.35 <sup>15</sup>
Oct. 7.1	18.086 <sup>70</sup>	42.45 <sup>15</sup>	20.054 <sup>84</sup>	44.74 <sup>114</sup>	7.877 <sup>99</sup>	79.28 <sup>160</sup>	34.471 <sup>74</sup>	35.34 <sup>1</sup>
17.1	18.053 <sup>33</sup>	42.46 <sup>1</sup>	20.005 <sup>49</sup>	43.34 <sup>140</sup>	7.830 <sup>47</sup>	77.64 <sup>164</sup>	34.434 <sup>37</sup>	35.52 <sup>18</sup>
	11	20	5	168	11	160	5	35
27.0	18.064	42.66	20.000	41.66	7.841	76.04	34.439	35.87
Nov. 6.0	18.123 <sup>59</sup>	43.06 <sup>40</sup>	20.042 <sup>42</sup>	39.74 <sup>192</sup>	7.916 <sup>75</sup>	74.56 <sup>148</sup>	34.492 <sup>53</sup>	36.44 <sup>57</sup>
16.0	18.232 <sup>109</sup>	43.69 <sup>63</sup>	20.133 <sup>91</sup>	37.59 <sup>215</sup>	8.059 <sup>143</sup>	73.26 <sup>130</sup>	34.595 <sup>103</sup>	37.24 <sup>80</sup>
25.9	18.392 <sup>160</sup>	44.55 <sup>86</sup>	20.276 <sup>143</sup>	35.28 <sup>231</sup>	8.267 <sup>208</sup>	72.22 <sup>104</sup>	34.748 <sup>153</sup>	38.26 <sup>102</sup>
Dec. 5.9	18.600 <sup>208</sup>	45.64 <sup>109</sup>	20.464 <sup>188</sup>	32.85 <sup>243</sup>	8.535 <sup>268</sup>	71.48 <sup>74</sup>	34.948 <sup>200</sup>	39.49 <sup>123</sup>
	249	128	233	249	322	40	243	141
15.9	18.849	46.92	20.697	30.36	8.857	71.08	35.191	40.90
25.9	19.131 <sup>282</sup>	48.36 <sup>144</sup>	20.968 <sup>269</sup>	27.89 <sup>247</sup>	9.222 <sup>365</sup>	71.04 <sup>4</sup>	35.468 <sup>277</sup>	42.46 <sup>156</sup>
35.8	19.440 <sup>309</sup>	49.94 <sup>158</sup>	21.262 <sup>296</sup>	25.53 <sup>236</sup>	9.620 <sup>396</sup>	71.36 <sup>32</sup>	35.771 <sup>303</sup>	44.12 <sup>166</sup>
Mean Place	15.680	31.52	18.093	51.83	5.179	62.05	32.093	25.13
Sec $\delta$ , Tan $\delta$	1.019	-0.196	1.034	+0.264	1.363	-0.926	1.010	-0.144
$D\psi a$ , $D\omega a$	+0.07	-0.01	+0.06	+0.01	+0.08	-0.04	+0.06	-0.01
$D\psi \delta$ , $D\omega \delta$	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Boötis. Mag. 3.6		$\gamma$ Scorpii. Mag. 3.4		$\psi$ Boötis. Mag. 4.7		$\zeta$ Boötis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 14 58	° ' " +40 42	h m 14 59	° ' " -24 57	h m 15 0	° ' " +27 15	h m 15 3	° ' " +25 11
	s	"	s	"	s	"	s	"
Jan. 0.8	49.013	43.79	12.748	24.11	53.365	58.68	39.364	15.17
10.8	49.358 <sup>345</sup>	41.18 <sup>261</sup>	13.094 <sup>346</sup>	25.26 <sup>115</sup>	53.681 <sup>316</sup>	56.19 <sup>249</sup>	39.676 <sup>312</sup>	12.70 <sup>247</sup>
20.8	49.723 <sup>365</sup>	39.01 <sup>217</sup>	13.451 <sup>357</sup>	26.56 <sup>130</sup>	54.013 <sup>332</sup>	54.03 <sup>216</sup>	40.005 <sup>329</sup>	10.54 <sup>216</sup>
30.8	50.098 <sup>375</sup>	37.35 <sup>166</sup>	13.809 <sup>358</sup>	27.98 <sup>142</sup>	54.351 <sup>338</sup>	52.29 <sup>174</sup>	40.341 <sup>336</sup>	8.77 <sup>177</sup>
Feb. 9.7	50.471 <sup>373</sup>	36.26 <sup>109</sup>	14.160 <sup>351</sup>	29.46 <sup>148</sup>	54.687 <sup>336</sup>	51.01 <sup>128</sup>	40.673 <sup>332</sup>	7.45 <sup>132</sup>
19.7	50.832 <sup>361</sup>	35.77 <sup>49</sup>	14.497 <sup>337</sup>	30.96 <sup>150</sup>	55.011 <sup>324</sup>	50.24 <sup>77</sup>	40.994 <sup>321</sup>	6.62 <sup>83</sup>
Mar. 1.7	51.171 <sup>339</sup>	35.88 <sup>11</sup>	14.814 <sup>317</sup>	32.44 <sup>148</sup>	55.314 <sup>308</sup>	49.99 <sup>25</sup>	41.296 <sup>302</sup>	6.30 <sup>32</sup>
11.7	51.480 <sup>309</sup>	36.56 <sup>68</sup>	15.105 <sup>291</sup>	33.85 <sup>141</sup>	55.593 <sup>279</sup>	50.26 <sup>27</sup>	41.574 <sup>278</sup>	6.48 <sup>18</sup>
21.6	51.754 <sup>274</sup>	37.78 <sup>122</sup>	15.369 <sup>264</sup>	35.17 <sup>132</sup>	55.841 <sup>248</sup>	51.00 <sup>74</sup>	41.823 <sup>249</sup>	7.14 <sup>66</sup>
31.6	51.990 <sup>236</sup>	39.48 <sup>170</sup>	15.606 <sup>237</sup>	36.38 <sup>121</sup>	56.067 <sup>216</sup>	52.18 <sup>118</sup>	42.040 <sup>217</sup>	8.22 <sup>108</sup>
Apr. 10.6	52.182 <sup>192</sup>	41.57 <sup>209</sup>	15.811 <sup>205</sup>	37.48 <sup>110</sup>	56.240 <sup>183</sup>	53.73 <sup>155</sup>	42.225 <sup>185</sup>	9.65 <sup>143</sup>
20.5	52.332 <sup>150</sup>	43.94 <sup>237</sup>	15.986 <sup>175</sup>	38.44 <sup>96</sup>	56.386 <sup>146</sup>	55.56 <sup>133</sup>	42.375 <sup>150</sup>	11.39 <sup>174</sup>
30.5	52.438 <sup>106</sup>	46.52 <sup>258</sup>	16.130 <sup>144</sup>	39.30 <sup>86</sup>	56.437 <sup>111</sup>	57.61 <sup>205</sup>	42.490 <sup>115</sup>	13.34 <sup>193</sup>
May 10.5	52.501 <sup>63</sup>	49.20 <sup>268</sup>	16.243 <sup>113</sup>	40.02 <sup>72</sup>	56.574 <sup>77</sup>	59.78 <sup>217</sup>	42.571 <sup>81</sup>	15.43 <sup>209</sup>
20.5	52.521 <sup>20</sup>	51.88 <sup>268</sup>	16.324 <sup>81</sup>	40.63 <sup>61</sup>	56.617 <sup>43</sup>	61.99 <sup>221</sup>	42.620 <sup>49</sup>	17.56 <sup>213</sup>
30.4	52.502 <sup>19</sup>	54.47 <sup>259</sup>	16.375 <sup>51</sup>	41.11 <sup>48</sup>	56.626 <sup>9</sup>	64.17 <sup>218</sup>	42.635 <sup>15</sup>	19.65 <sup>209</sup>
June 9.4	52.444 <sup>58</sup>	56.91 <sup>244</sup>	16.392 <sup>17</sup>	41.48 <sup>37</sup>	56.602 <sup>24</sup>	66.24 <sup>207</sup>	42.618 <sup>17</sup>	21.67 <sup>202</sup>
19.4	52.350 <sup>94</sup>	59.10 <sup>219</sup>	16.378 <sup>14</sup>	41.71 <sup>23</sup>	56.548 <sup>54</sup>	68.16 <sup>192</sup>	42.571 <sup>47</sup>	23.55 <sup>188</sup>
29.4	52.223 <sup>127</sup>	61.01 <sup>191</sup>	16.334 <sup>44</sup>	41.83 <sup>12</sup>	56.465 <sup>83</sup>	69.85 <sup>169</sup>	42.495 <sup>76</sup>	25.21 <sup>166</sup>
July 9.3	52.066 <sup>157</sup>	62.57 <sup>156</sup>	16.260 <sup>74</sup>	41.82 <sup>1</sup>	56.355 <sup>110</sup>	71.29 <sup>144</sup>	42.393 <sup>102</sup>	26.63 <sup>142</sup>
19.3	51.885 <sup>181</sup>	63.75 <sup>118</sup>	16.160 <sup>100</sup>	41.67 <sup>15</sup>	56.222 <sup>133</sup>	72.43 <sup>114</sup>	42.266 <sup>127</sup>	27.77 <sup>114</sup>
29.3	51.683 <sup>202</sup>	64.52 <sup>77</sup>	16.036 <sup>124</sup>	41.37 <sup>30</sup>	56.069 <sup>153</sup>	73.25 <sup>82</sup>	42.120 <sup>146</sup>	28.60 <sup>83</sup>
Aug. 8.2	51.465 <sup>218</sup>	64.86 <sup>34</sup>	15.896 <sup>140</sup>	40.95 <sup>42</sup>	55.901 <sup>168</sup>	73.74 <sup>49</sup>	41.958 <sup>162</sup>	29.12 <sup>52</sup>
18.2	51.239 <sup>226</sup>	64.77 <sup>9</sup>	15.745 <sup>151</sup>	40.40 <sup>55</sup>	55.724 <sup>177</sup>	73.87 <sup>13</sup>	41.787 <sup>171</sup>	29.29 <sup>17</sup>
28.2	51.013 <sup>226</sup>	64.24 <sup>53</sup>	15.589 <sup>156</sup>	39.75 <sup>65</sup>	55.545 <sup>179</sup>	73.63 <sup>24</sup>	41.613 <sup>174</sup>	29.11 <sup>18</sup>
Sept. 7.2	50.794 <sup>219</sup>	63.27 <sup>97</sup>	15.437 <sup>182</sup>	39.00 <sup>75</sup>	55.370 <sup>175</sup>	73.04 <sup>59</sup>	41.442 <sup>171</sup>	28.60 <sup>51</sup>
17.1	50.591 <sup>203</sup>	61.89 <sup>138</sup>	15.299 <sup>138</sup>	38.19 <sup>81</sup>	55.208 <sup>162</sup>	72.09 <sup>95</sup>	41.285 <sup>157</sup>	27.72 <sup>88</sup>
27.1	50.413 <sup>178</sup>	60.09 <sup>180</sup>	15.186 <sup>113</sup>	37.36 <sup>83</sup>	55.067 <sup>141</sup>	70.78 <sup>131</sup>	41.147 <sup>138</sup>	26.50 <sup>122</sup>
Oct. 7.1	50.268 <sup>145</sup>	57.91 <sup>218</sup>	15.104 <sup>82</sup>	36.55 <sup>81</sup>	54.956 <sup>111</sup>	69.13 <sup>165</sup>	41.038 <sup>109</sup>	24.94 <sup>156</sup>
17.1	50.166 <sup>102</sup>	55.38 <sup>253</sup>	15.064 <sup>40</sup>	35.82 <sup>73</sup>	54.883 <sup>73</sup>	67.15 <sup>196</sup>	40.966 <sup>72</sup>	23.08 <sup>186</sup>
27.0	50.114 <sup>52</sup>	52.55 <sup>283</sup>	15.071 <sup>7</sup>	35.19 <sup>63</sup>	54.854 <sup>29</sup>	64.89 <sup>226</sup>	40.937 <sup>29</sup>	20.91 <sup>217</sup>
Nov. 6.0	50.118 <sup>4</sup>	49.47 <sup>308</sup>	15.130 <sup>59</sup>	34.73 <sup>46</sup>	54.874 <sup>20</sup>	62.37 <sup>252</sup>	40.957 <sup>20</sup>	18.50 <sup>241</sup>
16.0	50.180 <sup>62</sup>	46.22 <sup>325</sup>	15.244 <sup>114</sup>	34.48 <sup>25</sup>	54.946 <sup>72</sup>	59.64 <sup>273</sup>	41.029 <sup>72</sup>	15.86 <sup>264</sup>
25.9	50.303 <sup>123</sup>	42.86 <sup>336</sup>	15.413 <sup>169</sup>	34.47 <sup>1</sup>	55.072 <sup>126</sup>	56.76 <sup>288</sup>	41.153 <sup>124</sup>	13.07 <sup>279</sup>
Dec. 5.9	50.485 <sup>182</sup>	39.48 <sup>338</sup>	15.633 <sup>220</sup>	34.72 <sup>25</sup>	55.250 <sup>178</sup>	53.82 <sup>294</sup>	41.328 <sup>175</sup>	10.20 <sup>287</sup>
15.9	50.722 <sup>237</sup>	36.18 <sup>330</sup>	15.898 <sup>265</sup>	35.23 <sup>51</sup>	55.475 <sup>225</sup>	50.88 <sup>294</sup>	41.551 <sup>223</sup>	7.33 <sup>287</sup>
25.9	51.006 <sup>284</sup>	33.08 <sup>310</sup>	16.200 <sup>302</sup>	36.00 <sup>77</sup>	55.741 <sup>266</sup>	48.03 <sup>285</sup>	41.814 <sup>263</sup>	4.54 <sup>279</sup>
35.8	51.329 <sup>323</sup>	30.26 <sup>282</sup>	16.530 <sup>330</sup>	36.99 <sup>90</sup>	56.039 <sup>296</sup>	45.39 <sup>264</sup>	42.109 <sup>295</sup>	1.93 <sup>261</sup>
Mean Place	49.182	62.45	12.512	23.19	53.334	74.23	39.326	30.10
Sec $\delta$ , Tan $\delta$	1.319	+0.860	1.103	-0.465	1.125	+0.515	1.105	+0.470
$D\psi\alpha$ , $D\omega\alpha$	+0.05	+0.04	+0.07	-0.02	+0.05	+0.02	+0.05	+0.02
$D\psi\delta$ , $D\omega\delta$	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♄ Lupi. Mag. 3.5		♋ Libræ. Mag. 4.7		♏ Serpentis. Mag. 5.4		♊ Triang. Aust. Mag. 3.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m s	° ' " " "	h m s	° ' " " "	h m s	° ' " " "	h m s	° ' " " "
Jan. 0.9	18.760	57.26	29.405	45.09	3.861	38.97	7.62	19.24
10.8	19.229 <sup>469</sup>	57.34 <sup>8</sup>	29.735 <sup>330</sup>	46.35 <sup>126</sup>	4.163 <sup>302</sup>	36.93 <sup>204</sup>	8.34 <sup>72</sup>	18.67 <sup>57</sup>
20.8	19.718 <sup>489</sup>	57.82 <sup>48</sup>	30.077 <sup>342</sup>	47.73 <sup>138</sup>	4.479 <sup>316</sup>	35.01 <sup>192</sup>	9.09 <sup>75</sup>	18.59 <sup>3</sup>
30.8	20.213 <sup>495</sup>	58.67 <sup>85</sup>	30.422 <sup>345</sup>	49.17 <sup>144</sup>	4.799 <sup>320</sup>	33.30 <sup>171</sup>	9.87 <sup>78</sup>	19.01 <sup>42</sup>
Feb. 9.7	20.701 <sup>488</sup>	59.86 <sup>119</sup>	30.763 <sup>341</sup>	50.63 <sup>146</sup>	5.116 <sup>317</sup>	31.84 <sup>146</sup>	10.64 <sup>77</sup>	19.89 <sup>83</sup>
19.7	21.173	61.34	31.091	52.03	5.422	30.70	11.39	21.20
Mar. 1.7	21.620 <sup>447</sup>	63.07 <sup>173</sup>	31.399 <sup>308</sup>	53.35 <sup>132</sup>	5.712 <sup>290</sup>	29.89 <sup>81</sup>	12.10 <sup>71</sup>	22.90 <sup>170</sup>
11.7	22.037 <sup>417</sup>	64.99 <sup>192</sup>	31.686 <sup>287</sup>	54.56 <sup>121</sup>	5.980 <sup>268</sup>	29.42 <sup>47</sup>	12.77 <sup>67</sup>	24.94 <sup>204</sup>
21.6	22.417 <sup>380</sup>	67.07 <sup>208</sup>	31.947 <sup>261</sup>	55.63 <sup>107</sup>	6.223 <sup>243</sup>	29.30 <sup>12</sup>	13.39 <sup>62</sup>	27.25 <sup>231</sup>
31.6	22.757 <sup>340</sup>	69.25 <sup>218</sup>	32.181 <sup>234</sup>	56.56 <sup>93</sup>	6.439 <sup>216</sup>	29.51 <sup>21</sup>	13.94 <sup>55</sup>	29.81 <sup>256</sup>
Apr. 10.6	23.056 <sup>299</sup>	71.49 <sup>224</sup>	32.385 <sup>204</sup>	57.34 <sup>78</sup>	6.629 <sup>190</sup>	30.00 <sup>49</sup>	14.42 <sup>48</sup>	32.52 <sup>271</sup>
20.6	23.309 <sup>253</sup>	73.76 <sup>227</sup>	32.561 <sup>176</sup>	57.97 <sup>63</sup>	6.788 <sup>159</sup>	30.75 <sup>75</sup>	14.83 <sup>41</sup>	35.34 <sup>282</sup>
30.5	23.517 <sup>208</sup>	76.00 <sup>224</sup>	32.708 <sup>147</sup>	58.47 <sup>50</sup>	6.920 <sup>132</sup>	31.69 <sup>94</sup>	15.16 <sup>33</sup>	38.23 <sup>289</sup>
May 10.5	23.677 <sup>160</sup>	78.19 <sup>219</sup>	32.825 <sup>117</sup>	58.85 <sup>38</sup>	7.021 <sup>101</sup>	32.77 <sup>108</sup>	15.39 <sup>23</sup>	41.12 <sup>289</sup>
20.5	23.788 <sup>111</sup>	80.27 <sup>208</sup>	32.912 <sup>87</sup>	59.10 <sup>25</sup>	7.092 <sup>71</sup>	33.96 <sup>119</sup>	15.54 <sup>15</sup>	43.94 <sup>282</sup>
30.4	23.849 <sup>61</sup>	82.22 <sup>195</sup>	32.966 <sup>54</sup>	59.26 <sup>16</sup>	7.137 <sup>45</sup>	35.19 <sup>123</sup>	15.60 <sup>6</sup>	46.64 <sup>270</sup>
June 9.4	23.860 <sup>11</sup>	83.99 <sup>177</sup>	32.991 <sup>25</sup>	59.33 <sup>7</sup>	7.150 <sup>13</sup>	36.41 <sup>122</sup>	15.58 <sup>2</sup>	49.15 <sup>251</sup>
19.4	23.821 <sup>39</sup>	85.53 <sup>154</sup>	32.986 <sup>5</sup>	59.30 <sup>3</sup>	7.135 <sup>15</sup>	37.58 <sup>117</sup>	15.47 <sup>11</sup>	51.42 <sup>227</sup>
29.4	23.734 <sup>87</sup>	86.82 <sup>129</sup>	32.950 <sup>36</sup>	59.19 <sup>11</sup>	7.093 <sup>42</sup>	38.70 <sup>112</sup>	15.26 <sup>21</sup>	53.39 <sup>197</sup>
July 9.3	23.602 <sup>132</sup>	87.83 <sup>101</sup>	32.883 <sup>67</sup>	59.00 <sup>19</sup>	7.024 <sup>69</sup>	39.71 <sup>101</sup>	14.99 <sup>27</sup>	55.00 <sup>161</sup>
19.3	23.430 <sup>172</sup>	88.51 <sup>68</sup>	32.792 <sup>91</sup>	58.72 <sup>28</sup>	6.931 <sup>93</sup>	40.59 <sup>88</sup>	14.65 <sup>34</sup>	56.22 <sup>122</sup>
29.3	23.223 <sup>207</sup>	88.84 <sup>33</sup>	32.677 <sup>115</sup>	58.36 <sup>36</sup>	6.817 <sup>114</sup>	41.33 <sup>74</sup>	14.26 <sup>39</sup>	56.99 <sup>77</sup>
Aug. 8.3	22.991 <sup>232</sup>	88.82 <sup>2</sup>	32.545 <sup>132</sup>	57.93 <sup>43</sup>	6.686 <sup>131</sup>	41.92 <sup>59</sup>	13.82 <sup>44</sup>	57.30 <sup>31</sup>
18.2	22.743 <sup>248</sup>	88.42 <sup>40</sup>	32.400 <sup>145</sup>	57.43 <sup>50</sup>	6.544 <sup>142</sup>	42.34 <sup>42</sup>	13.36 <sup>46</sup>	57.12 <sup>13</sup>
28.2	22.490 <sup>253</sup>	87.66 <sup>76</sup>	32.249 <sup>151</sup>	56.86 <sup>57</sup>	6.396 <sup>148</sup>	42.56 <sup>22</sup>	12.89 <sup>47</sup>	56.46 <sup>63</sup>
Sept. 7.2	22.244 <sup>246</sup>	86.56 <sup>110</sup>	32.102 <sup>147</sup>	56.26 <sup>60</sup>	6.250 <sup>146</sup>	42.60 <sup>4</sup>	12.44 <sup>45</sup>	55.33 <sup>113</sup>
17.1	22.021 <sup>223</sup>	85.16 <sup>140</sup>	31.965 <sup>137</sup>	55.65 <sup>61</sup>	6.113 <sup>137</sup>	42.41 <sup>19</sup>	12.02 <sup>42</sup>	53.76 <sup>157</sup>
27.1	21.831 <sup>190</sup>	83.49 <sup>167</sup>	31.850 <sup>115</sup>	55.05 <sup>60</sup>	5.996 <sup>117</sup>	42.02 <sup>39</sup>	11.67 <sup>35</sup>	51.80 <sup>196</sup>
Oct. 7.1	21.690 <sup>141</sup>	81.64 <sup>185</sup>	31.765 <sup>85</sup>	54.52 <sup>53</sup>	5.904 <sup>92</sup>	41.39 <sup>63</sup>	11.39 <sup>28</sup>	49.54 <sup>226</sup>
17.1	21.607 <sup>83</sup>	79.66 <sup>198</sup>	31.716 <sup>49</sup>	54.07 <sup>45</sup>	5.847 <sup>57</sup>	40.54 <sup>85</sup>	11.20 <sup>19</sup>	47.03 <sup>251</sup>
27.0	21.593 <sup>14</sup>	77.65 <sup>201</sup>	31.714 <sup>2</sup>	53.77 <sup>30</sup>	5.831 <sup>16</sup>	39.43 <sup>111</sup>	11.14 <sup>6</sup>	44.39 <sup>264</sup>
Nov. 6.0	21.655 <sup>62</sup>	75.69 <sup>196</sup>	31.763 <sup>49</sup>	53.62 <sup>15</sup>	5.861 <sup>30</sup>	38.10 <sup>133</sup>	11.19 <sup>5</sup>	41.72 <sup>267</sup>
16.0	21.794 <sup>139</sup>	73.87 <sup>182</sup>	31.864 <sup>101</sup>	53.68 <sup>6</sup>	5.940 <sup>79</sup>	36.53 <sup>157</sup>	11.36 <sup>17</sup>	39.14 <sup>258</sup>
26.0	22.009 <sup>215</sup>	72.27 <sup>160</sup>	32.017 <sup>153</sup>	53.98 <sup>30</sup>	6.069 <sup>129</sup>	34.77 <sup>176</sup>	11.67 <sup>31</sup>	36.72 <sup>242</sup>
Dec. 5.9	22.298 <sup>289</sup>	70.96 <sup>131</sup>	32.221 <sup>204</sup>	54.51 <sup>53</sup>	6.246 <sup>204</sup>	32.84 <sup>193</sup>	12.09 <sup>42</sup>	34.59 <sup>213</sup>
15.9	22.650 <sup>352</sup>	69.98 <sup>98</sup>	32.469 <sup>248</sup>	55.27 <sup>76</sup>	6.466 <sup>220</sup>	30.81 <sup>203</sup>	12.61 <sup>52</sup>	32.81 <sup>178</sup>
25.9	23.056 <sup>406</sup>	69.40 <sup>58</sup>	32.754 <sup>285</sup>	56.25 <sup>98</sup>	6.723 <sup>257</sup>	28.72 <sup>209</sup>	13.22 <sup>61</sup>	31.45 <sup>136</sup>
35.8	23.503 <sup>447</sup>	69.21 <sup>19</sup>	33.068 <sup>314</sup>	57.42 <sup>117</sup>	7.009 <sup>286</sup>	26.64 <sup>208</sup>	13.90 <sup>68</sup>	30.56 <sup>89</sup>
Mean Place	18.818	62.64	29.193	42.58	3.707	48.40	8.361	27.17
Sec $\delta$ , Tan $\delta$	1.617	-1.270	1.061	-0.354	1.004	+0.092	2.714	-2.522
$D\psi\alpha$ , $D\omega\alpha$	+0.08	-0.06	+0.07	-0.02	+0.06	0.00	+0.11	-0.11
$D\psi\delta$ , $D\omega\delta$	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7	-0.3	-0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Boötis. Mag. 3.5		$\beta$ Libræ. Mag. 2.7		$\gamma$ Ursæ Minoris. Mag. 3.1		$\mu$ Boötis pr. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 12 s	° ' " +33 36	h m 15 12 s	° ' " - 9 4	h m 15 20 s	° ' " +72 7	h m 15 21 s	° ' " +37 39
Jan. 0.9	9.271	69.02	32.483	44.12	48.51	23.92	21.019	46.52
10.8	9.590 <sup>319</sup>	66.39 <sup>263</sup>	32.795 <sup>312</sup>	45.73 <sup>161</sup>	49.12 <sup>61</sup>	21.26 <sup>266</sup>	21.339 <sup>320</sup>	43.82 <sup>270</sup>
20.8	9.929 <sup>339</sup>	64.14 <sup>225</sup>	33.120 <sup>325</sup>	47.34 <sup>161</sup>	49.80 <sup>68</sup>	19.13 <sup>213</sup>	21.684 <sup>345</sup>	41.50 <sup>232</sup>
30.8	10.279 <sup>350</sup>	62.35 <sup>179</sup>	33.449 <sup>329</sup>	48.91 <sup>157</sup>	50.54 <sup>74</sup>	17.62 <sup>151</sup>	22.041 <sup>357</sup>	39.66 <sup>184</sup>
Feb. 9.7	10.629 <sup>350</sup>	61.07 <sup>128</sup>	33.774 <sup>325</sup>	50.37 <sup>146</sup>	51.31 <sup>77</sup>	16.77 <sup>85</sup>	22.401 <sup>360</sup>	38.36 <sup>130</sup>
19.7	10.969 <sup>340</sup>	60.34 <sup>73</sup>	34.088 <sup>314</sup>	51.67 <sup>130</sup>	52.07 <sup>76</sup>	16.60 <sup>17</sup>	22.753 <sup>352</sup>	37.63 <sup>73</sup>
Mar. 1.7	11.292 <sup>323</sup>	60.17 <sup>17</sup>	34.384 <sup>296</sup>	52.77 <sup>110</sup>	52.81 <sup>74</sup>	17.12 <sup>52</sup>	23.090 <sup>337</sup>	37.49 <sup>14</sup>
11.7	11.589 <sup>297</sup>	60.56 <sup>39</sup>	34.659 <sup>275</sup>	53.66 <sup>89</sup>	53.49 <sup>68</sup>	18.28 <sup>116</sup>	23.402 <sup>312</sup>	37.95 <sup>46</sup>
21.6	11.857 <sup>268</sup>	61.48 <sup>92</sup>	34.910 <sup>251</sup>	54.32 <sup>66</sup>	54.10 <sup>61</sup>	20.03 <sup>175</sup>	23.686 <sup>284</sup>	38.94 <sup>99</sup>
31.6	12.092 <sup>235</sup>	62.86 <sup>138</sup>	35.136 <sup>226</sup>	54.76 <sup>44</sup>	54.62 <sup>52</sup>	22.30 <sup>227</sup>	23.935 <sup>249</sup>	40.43 <sup>149</sup>
Apr. 10.6	12.290 <sup>198</sup>	64.64 <sup>178</sup>	35.334 <sup>198</sup>	54.98 <sup>22</sup>	55.03 <sup>41</sup>	24.98 <sup>268</sup>	24.147 <sup>212</sup>	42.33 <sup>190</sup>
20.6	12.451 <sup>161</sup>	66.74 <sup>210</sup>	35.504 <sup>170</sup>	55.02 <sup>4</sup>	55.33 <sup>30</sup>	27.98 <sup>300</sup>	24.320 <sup>173</sup>	44.57 <sup>224</sup>
30.5	12.574 <sup>123</sup>	69.05 <sup>231</sup>	35.646 <sup>142</sup>	54.90 <sup>12</sup>	55.51 <sup>18</sup>	31.16 <sup>318</sup>	24.452 <sup>132</sup>	47.04 <sup>247</sup>
May 10.5	12.658 <sup>84</sup>	71.50 <sup>245</sup>	35.759 <sup>113</sup>	54.63 <sup>27</sup>	55.56 <sup>5</sup>	34.42 <sup>326</sup>	24.545 <sup>93</sup>	49.67 <sup>263</sup>
20.5	12.706 <sup>48</sup>	73.99 <sup>249</sup>	35.843 <sup>84</sup>	54.26 <sup>37</sup>	55.50 <sup>6</sup>	37.65 <sup>323</sup>	24.596 <sup>51</sup>	52.33 <sup>266</sup>
30.4	12.715 <sup>9</sup>	76.44 <sup>245</sup>	35.899 <sup>56</sup>	53.82 <sup>44</sup>	55.32 <sup>18</sup>	40.74 <sup>309</sup>	24.608 <sup>12</sup>	54.95 <sup>262</sup>
June 9.4	12.689 <sup>26</sup>	78.78 <sup>234</sup>	35.924 <sup>25</sup>	53.32 <sup>50</sup>	55.04 <sup>28</sup>	43.61 <sup>287</sup>	24.580 <sup>28</sup>	57.46 <sup>261</sup>
19.4	12.629 <sup>60</sup>	80.93 <sup>215</sup>	35.920 <sup>4</sup>	52.78 <sup>54</sup>	54.65 <sup>39</sup>	46.16 <sup>255</sup>	24.515 <sup>65</sup>	59.78 <sup>232</sup>
29.4	12.537 <sup>92</sup>	82.84 <sup>191</sup>	35.886 <sup>34</sup>	52.23 <sup>55</sup>	54.18 <sup>47</sup>	48.33 <sup>217</sup>	24.416 <sup>99</sup>	61.83 <sup>206</sup>
July 9.3	12.414 <sup>123</sup>	84.45 <sup>161</sup>	35.825 <sup>61</sup>	51.67 <sup>56</sup>	53.62 <sup>56</sup>	50.07 <sup>174</sup>	24.284 <sup>132</sup>	63.58 <sup>175</sup>
19.3	12.267 <sup>147</sup>	85.72 <sup>127</sup>	35.739 <sup>86</sup>	51.11 <sup>56</sup>	53.01 <sup>61</sup>	51.34 <sup>127</sup>	24.123 <sup>161</sup>	64.99 <sup>141</sup>
29.3	12.096 <sup>171</sup>	86.65 <sup>93</sup>	35.630 <sup>109</sup>	50.57 <sup>54</sup>	52.35 <sup>66</sup>	52.09 <sup>75</sup>	23.939 <sup>184</sup>	66.00 <sup>101</sup>
Aug. 8.3	11.909 <sup>187</sup>	87.19 <sup>54</sup>	35.503 <sup>127</sup>	50.06 <sup>51</sup>	51.66 <sup>69</sup>	52.03 <sup>24</sup>	23.736 <sup>203</sup>	66.61 <sup>61</sup>
18.2	11.711 <sup>198</sup>	87.33 <sup>14</sup>	35.364 <sup>139</sup>	49.58 <sup>48</sup>	50.95 <sup>71</sup>	52.34 <sup>29</sup>	23.519 <sup>217</sup>	66.79 <sup>18</sup>
28.2	11.509 <sup>202</sup>	87.07 <sup>26</sup>	35.218 <sup>146</sup>	49.14 <sup>44</sup>	50.24 <sup>71</sup>	51.23 <sup>81</sup>	23.297 <sup>222</sup>	66.55 <sup>24</sup>
Sept. 7.2	11.310 <sup>199</sup>	86.40 <sup>67</sup>	35.074 <sup>144</sup>	48.77 <sup>37</sup>	49.55 <sup>69</sup>	49.90 <sup>183</sup>	23.077 <sup>220</sup>	65.88 <sup>67</sup>
17.1	11.122 <sup>188</sup>	85.33 <sup>107</sup>	34.940 <sup>134</sup>	48.48 <sup>29</sup>	48.90 <sup>65</sup>	48.08 <sup>182</sup>	22.870 <sup>207</sup>	64.78 <sup>110</sup>
27.1	10.957 <sup>165</sup>	83.87 <sup>146</sup>	34.826 <sup>114</sup>	48.31 <sup>17</sup>	48.30 <sup>60</sup>	45.81 <sup>227</sup>	22.682 <sup>188</sup>	63.28 <sup>150</sup>
Oct. 7.1	10.821 <sup>136</sup>	82.05 <sup>182</sup>	34.738 <sup>88</sup>	48.25 <sup>6</sup>	47.78 <sup>52</sup>	43.13 <sup>268</sup>	22.524 <sup>158</sup>	61.39 <sup>189</sup>
17.1	10.723 <sup>98</sup>	79.87 <sup>218</sup>	34.686 <sup>52</sup>	48.35 <sup>10</sup>	47.34 <sup>44</sup>	40.08 <sup>305</sup>	22.405 <sup>119</sup>	59.12 <sup>227</sup>
27.0	10.670 <sup>53</sup>	77.37 <sup>250</sup>	34.677 <sup>9</sup>	48.65 <sup>30</sup>	47.00 <sup>34</sup>	36.73 <sup>335</sup>	22.332 <sup>73</sup>	56.53 <sup>259</sup>
Nov. 6.0	10.670 <sup>0</sup>	74.62 <sup>275</sup>	34.715 <sup>38</sup>	49.13 <sup>48</sup>	46.78 <sup>22</sup>	33.14 <sup>359</sup>	22.311 <sup>21</sup>	53.67 <sup>286</sup>
16.0	10.723 <sup>53</sup>	71.64 <sup>298</sup>	34.803 <sup>88</sup>	49.83 <sup>70</sup>	46.69 <sup>9</sup>	29.41 <sup>373</sup>	22.347 <sup>36</sup>	50.58 <sup>309</sup>
26.0	10.833 <sup>110</sup>	68.53 <sup>311</sup>	34.941 <sup>138</sup>	50.75 <sup>92</sup>	46.74 <sup>5</sup>	25.63 <sup>378</sup>	22.443 <sup>96</sup>	47.35 <sup>323</sup>
Dec. 5.9	10.998 <sup>165</sup>	65.36 <sup>317</sup>	35.128 <sup>187</sup>	51.88 <sup>113</sup>	46.91 <sup>17</sup>	21.89 <sup>374</sup>	22.596 <sup>153</sup>	44.06 <sup>329</sup>
15.9	11.214 <sup>216</sup>	62.21 <sup>315</sup>	35.359 <sup>231</sup>	53.18 <sup>130</sup>	47.22 <sup>31</sup>	18.31 <sup>358</sup>	22.804 <sup>208</sup>	40.79 <sup>327</sup>
25.9	11.476 <sup>262</sup>	59.20 <sup>301</sup>	35.626 <sup>267</sup>	54.64 <sup>146</sup>	47.67 <sup>45</sup>	14.99 <sup>332</sup>	23.060 <sup>256</sup>	37.66 <sup>313</sup>
35.8	11.775 <sup>299</sup>	56.40 <sup>280</sup>	35.922 <sup>296</sup>	56.19 <sup>155</sup>	48.21 <sup>54</sup>	12.07 <sup>292</sup>	23.357 <sup>297</sup>	34.78 <sup>288</sup>
Mean Place	9.406	85.59	32.293	38.73	51.060	45.49	21.295	63.51
Sec $\delta$ , Tan $\delta$	1.201	+0.665	1.013	-0.160	3.258	+3.101	1.263	+0.772
$D\alpha$ , $D\omega$ $\alpha$	+0.05	+0.03	+0.06	-0.01	0.00	+0.13	+0.05	+0.03
$D\delta$ , $D\omega$ $\delta$	-0.3	-0.7	-0.3	-0.7	-0.3	-0.8	-0.3	-0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\tau^1$ Serpentis. Mag. 5.5		$\epsilon$ Draconis. Mag. 3.5		32 Libræ. Mag. 5.9		$\beta$ Coronæ Borealis. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 21 s	° ' " +15 42 "	h m 15 23 s	° ' " +59 14 "	h m 15 23 s	° ' " -16 25 "	h m 15 24 s	° ' " +29 23 "
Jan. 0.9	56.353	56.83	3.881	62.67	34.500	44.08	24.276	12.98
10.8	56.647 <sup>294</sup>	54.50 <sup>233</sup>	4.295 <sup>414</sup>	59.88 <sup>279</sup>	34.817 <sup>317</sup>	45.36 <sup>128</sup>	24.580 <sup>304</sup>	10.37 <sup>261</sup>
20.8	56.961 <sup>314</sup>	52.41 <sup>209</sup>	4.753 <sup>458</sup>	57.59 <sup>229</sup>	35.149 <sup>332</sup>	46.72 <sup>136</sup>	24.905 <sup>325</sup>	8.10 <sup>227</sup>
30.8	57.282 <sup>321</sup>	50.61 <sup>180</sup>	5.239 <sup>486</sup>	55.88 <sup>171</sup>	35.487 <sup>338</sup>	48.11 <sup>139</sup>	25.241 <sup>336</sup>	6.24 <sup>186</sup>
Feb. 9.8	57.602 <sup>320</sup>	49.16 <sup>145</sup>	5.737 <sup>498</sup>	54.80 <sup>108</sup>	35.823 <sup>336</sup>	49.48 <sup>137</sup>	25.579 <sup>338</sup>	4.85 <sup>139</sup>
19.7	57.914 <sup>312</sup>	48.12 <sup>104</sup>	6.229 <sup>492</sup>	54.40 <sup>40</sup>	36.149 <sup>326</sup>	50.78 <sup>130</sup>	25.910 <sup>331</sup>	3.98 <sup>87</sup>
Mar. 1.7	58.211 <sup>297</sup>	47.53 <sup>59</sup>	6.704 <sup>475</sup>	54.67 <sup>27</sup>	36.458 <sup>309</sup>	51.95 <sup>117</sup>	26.226 <sup>316</sup>	3.65 <sup>33</sup>
11.7	58.487 <sup>276</sup>	47.36 <sup>17</sup>	7.146 <sup>442</sup>	55.60 <sup>93</sup>	36.749 <sup>291</sup>	52.99 <sup>104</sup>	26.520 <sup>294</sup>	3.86 <sup>21</sup>
21.6	58.739 <sup>252</sup>	47.62 <sup>26</sup>	7.543 <sup>397</sup>	57.12 <sup>152</sup>	37.016 <sup>267</sup>	53.88 <sup>89</sup>	26.788 <sup>268</sup>	4.58 <sup>72</sup>
31.6	58.965 <sup>226</sup>	48.28 <sup>66</sup>	7.886 <sup>343</sup>	59.17 <sup>205</sup>	37.259 <sup>243</sup>	54.59 <sup>71</sup>	27.026 <sup>238</sup>	5.77 <sup>119</sup>
Apr. 10.6	59.161 <sup>196</sup>	49.27 <sup>99</sup>	8.168 <sup>282</sup>	61.66 <sup>249</sup>	37.474 <sup>215</sup>	55.15 <sup>56</sup>	27.231 <sup>205</sup>	7.36 <sup>159</sup>
20.6	59.328 <sup>167</sup>	50.56 <sup>129</sup>	8.386 <sup>218</sup>	64.47 <sup>281</sup>	37.663 <sup>189</sup>	55.55 <sup>40</sup>	27.402 <sup>171</sup>	9.26 <sup>190</sup>
30.5	59.465 <sup>137</sup>	52.08 <sup>152</sup>	8.534 <sup>148</sup>	67.52 <sup>305</sup>	37.822 <sup>159</sup>	55.81 <sup>26</sup>	27.539 <sup>137</sup>	11.42 <sup>216</sup>
May 10.5	59.570 <sup>105</sup>	53.75 <sup>167</sup>	8.614 <sup>80</sup>	70.68 <sup>316</sup>	37.952 <sup>130</sup>	55.95 <sup>14</sup>	27.639 <sup>100</sup>	13.73 <sup>231</sup>
20.5	59.644 <sup>74</sup>	55.51 <sup>176</sup>	8.625 <sup>11</sup>	73.85 <sup>317</sup>	38.053 <sup>101</sup>	55.99 <sup>4</sup>	27.703 <sup>64</sup>	16.10 <sup>237</sup>
30.5	59.689 <sup>45</sup>	57.29 <sup>178</sup>	8.569 <sup>56</sup>	76.91 <sup>306</sup>	38.122 <sup>69</sup>	55.94 <sup>5</sup>	27.731 <sup>28</sup>	18.47 <sup>237</sup>
June 9.4	59.700 <sup>11</sup>	59.03 <sup>174</sup>	8.451 <sup>118</sup>	79.79 <sup>288</sup>	38.161 <sup>39</sup>	55.82 <sup>12</sup>	27.725 <sup>6</sup>	20.75 <sup>228</sup>
19.4	59.682 <sup>18</sup>	60.67 <sup>164</sup>	8.273 <sup>178</sup>	82.39 <sup>260</sup>	38.168 <sup>7</sup>	55.64 <sup>18</sup>	27.685 <sup>40</sup>	22.86 <sup>211</sup>
29.4	59.635 <sup>47</sup>	62.18 <sup>151</sup>	8.042 <sup>231</sup>	84.65 <sup>226</sup>	38.144 <sup>24</sup>	55.39 <sup>25</sup>	27.612 <sup>73</sup>	24.78 <sup>192</sup>
July 9.3	59.557 <sup>78</sup>	63.51 <sup>133</sup>	7.764 <sup>278</sup>	86.50 <sup>185</sup>	38.090 <sup>54</sup>	55.10 <sup>29</sup>	27.509 <sup>103</sup>	26.43 <sup>165</sup>
19.3	59.457 <sup>100</sup>	64.64 <sup>113</sup>	7.445 <sup>319</sup>	87.94 <sup>144</sup>	38.007 <sup>83</sup>	54.76 <sup>34</sup>	27.378 <sup>131</sup>	27.78 <sup>135</sup>
29.3	59.333 <sup>124</sup>	65.55 <sup>91</sup>	7.092 <sup>353</sup>	88.87 <sup>93</sup>	37.899 <sup>108</sup>	54.37 <sup>39</sup>	27.224 <sup>154</sup>	28.80 <sup>102</sup>
Aug. 8.3	59.191 <sup>142</sup>	66.20 <sup>65</sup>	6.717 <sup>375</sup>	89.31 <sup>44</sup>	37.772 <sup>127</sup>	53.95 <sup>42</sup>	27.050 <sup>174</sup>	29.47 <sup>67</sup>
18.2	59.035 <sup>156</sup>	66.59 <sup>39</sup>	6.328 <sup>389</sup>	89.24 <sup>7</sup>	37.629 <sup>143</sup>	53.49 <sup>46</sup>	26.864 <sup>186</sup>	29.77 <sup>30</sup>
28.2	58.874 <sup>161</sup>	66.70 <sup>11</sup>	5.934 <sup>394</sup>	88.66 <sup>58</sup>	37.478 <sup>151</sup>	53.01 <sup>48</sup>	26.670 <sup>194</sup>	29.69 <sup>8</sup>
Sept. 7.2	58.712 <sup>162</sup>	66.52 <sup>18</sup>	5.547 <sup>387</sup>	87.57 <sup>109</sup>	37.327 <sup>151</sup>	52.52 <sup>49</sup>	26.478 <sup>192</sup>	29.24 <sup>45</sup>
17.2	58.559 <sup>153</sup>	66.06 <sup>46</sup>	5.180 <sup>367</sup>	86.00 <sup>157</sup>	37.185 <sup>142</sup>	52.04 <sup>48</sup>	26.296 <sup>182</sup>	28.40 <sup>84</sup>
27.1	58.422 <sup>137</sup>	65.30 <sup>76</sup>	4.845 <sup>335</sup>	83.96 <sup>204</sup>	37.061 <sup>124</sup>	51.59 <sup>45</sup>	26.132 <sup>164</sup>	27.18 <sup>122</sup>
Oct. 7.1	58.312 <sup>110</sup>	64.25 <sup>105</sup>	4.552 <sup>293</sup>	81.50 <sup>246</sup>	36.964 <sup>97</sup>	51.21 <sup>38</sup>	25.994 <sup>138</sup>	25.59 <sup>159</sup>
17.1	58.236 <sup>76</sup>	62.91 <sup>134</sup>	4.316 <sup>236</sup>	78.66 <sup>284</sup>	36.903 <sup>61</sup>	50.94 <sup>27</sup>	25.893 <sup>101</sup>	23.67 <sup>192</sup>
27.0	58.200 <sup>36</sup>	61.28 <sup>163</sup>	4.146 <sup>170</sup>	75.47 <sup>319</sup>	36.885 <sup>18</sup>	50.79 <sup>15</sup>	25.835 <sup>58</sup>	21.42 <sup>225</sup>
Nov. 6.0	58.210 <sup>10</sup>	59.41 <sup>187</sup>	4.049 <sup>97</sup>	72.02 <sup>345</sup>	36.915 <sup>30</sup>	50.81 <sup>2</sup>	25.825 <sup>10</sup>	18.90 <sup>252</sup>
16.0	58.270 <sup>60</sup>	57.29 <sup>212</sup>	4.034 <sup>15</sup>	68.40 <sup>362</sup>	36.997 <sup>82</sup>	51.03 <sup>22</sup>	25.868 <sup>43</sup>	16.15 <sup>275</sup>
26.0	58.381 <sup>111</sup>	55.00 <sup>229</sup>	4.102 <sup>68</sup>	64.68 <sup>372</sup>	37.131 <sup>134</sup>	51.45 <sup>42</sup>	25.967 <sup>99</sup>	13.23 <sup>292</sup>
Dec. 5.9	58.541 <sup>160</sup>	52.56 <sup>244</sup>	4.256 <sup>154</sup>	60.96 <sup>372</sup>	37.316 <sup>185</sup>	52.09 <sup>64</sup>	26.118 <sup>151</sup>	10.22 <sup>301</sup>
15.9	58.747 <sup>206</sup>	50.07 <sup>249</sup>	4.493 <sup>237</sup>	57.36 <sup>360</sup>	37.546 <sup>230</sup>	52.95 <sup>86</sup>	26.320 <sup>202</sup>	7.20 <sup>302</sup>
25.9	58.993 <sup>246</sup>	47.58 <sup>249</sup>	4.804 <sup>311</sup>	53.98 <sup>338</sup>	37.815 <sup>269</sup>	53.99 <sup>104</sup>	26.566 <sup>246</sup>	4.27 <sup>293</sup>
35.9	59.270 <sup>277</sup>	45.17 <sup>241</sup>	5.181 <sup>377</sup>	50.95 <sup>303</sup>	38.113 <sup>298</sup>	55.18 <sup>119</sup>	26.848 <sup>282</sup>	1.51 <sup>276</sup>
Mean Place	56.323	68.76	4.993	82.97	34.354	40.70	24.423	28.09
Sec $\delta$ , Tan $\delta$	1.039	+0.281	1.956	+1.681	1.043	-0.295	1.148	+0.563
$D\psi\alpha$ , $D\omega\alpha$	+0.06	+0.01	+0.03	+0.07	+0.07	-0.01	+0.05	+0.02
$D\psi\delta$ , $D\omega\delta$	-0.3	-0.8	-0.3	-0.8	-0.3	-0.8	-0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Boötis. Mag. 5.2		$\gamma$ Lupi (mean). Mag. 3.0		$\gamma$ Libræ. Mag. 4.0		$\alpha$ Coronæ Borealis. Mag. 2.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 27	° ' " +41 6	h m 15 29	° ' " -40 53	h m 15 30	° ' " -14 30	h m 15 31	° ' " +26 59
Jan. 0.9	56.477	38.05	36.230	17.53	52.973	52.20	10.242	21.53
10.8	56.800 <sup>323</sup>	35.26 <sup>270</sup>	36.615 <sup>385</sup>	17.78 <sup>25</sup>	53.284 <sup>311</sup>	53.51 <sup>131</sup>	10.539 <sup>297</sup>	18.94 <sup>250</sup>
20.8	57.151 <sup>351</sup>	32.89 <sup>287</sup>	37.022 <sup>407</sup>	18.32 <sup>54</sup>	53.609 <sup>325</sup>	54.89 <sup>138</sup>	10.857 <sup>318</sup>	16.66 <sup>228</sup>
30.8	57.517 <sup>366</sup>	31.02 <sup>137</sup>	37.437 <sup>415</sup>	19.13 <sup>81</sup>	53.942 <sup>333</sup>	56.27 <sup>138</sup>	11.188 <sup>331</sup>	14.75 <sup>191</sup>
Feb. 9.8	57.889 <sup>372</sup>	29.69 <sup>138</sup>	37.851 <sup>414</sup>	20.17 <sup>104</sup>	54.275 <sup>333</sup>	57.61 <sup>134</sup>	11.521 <sup>333</sup>	13.31 <sup>144</sup>
19.7	58.255 <sup>366</sup>	28.95 <sup>74</sup>	38.255 <sup>404</sup>	21.41 <sup>124</sup>	54.599 <sup>324</sup>	58.86 <sup>125</sup>	11.848 <sup>327</sup>	12.38 <sup>93</sup>
Mar. 1.7	58.605 <sup>350</sup>	28.83 <sup>12</sup>	38.643 <sup>388</sup>	22.79 <sup>138</sup>	54.907 <sup>308</sup>	59.96 <sup>110</sup>	12.162 <sup>314</sup>	11.96 <sup>42</sup>
11.7	58.934 <sup>329</sup>	29.32 <sup>49</sup>	39.009 <sup>366</sup>	24.28 <sup>149</sup>	55.199 <sup>292</sup>	60.92 <sup>96</sup>	12.455 <sup>293</sup>	12.07 <sup>11</sup>
21.7	59.232 <sup>298</sup>	30.36 <sup>104</sup>	39.347 <sup>338</sup>	25.84 <sup>156</sup>	55.469 <sup>270</sup>	61.70 <sup>78</sup>	12.724 <sup>269</sup>	12.68 <sup>61</sup>
31.6	59.496 <sup>264</sup>	31.92 <sup>156</sup>	39.656 <sup>309</sup>	27.45 <sup>161</sup>	55.713 <sup>244</sup>	62.30 <sup>60</sup>	12.965 <sup>241</sup>	13.75 <sup>107</sup>
Apr. 10.6	59.721 <sup>225</sup>	33.92 <sup>200</sup>	39.934 <sup>278</sup>	29.08 <sup>163</sup>	55.932 <sup>219</sup>	62.73 <sup>43</sup>	13.175 <sup>210</sup>	15.22 <sup>147</sup>
20.6	59.906 <sup>185</sup>	36.25 <sup>233</sup>	40.177 <sup>243</sup>	30.70 <sup>162</sup>	56.126 <sup>194</sup>	62.99 <sup>26</sup>	13.353 <sup>178</sup>	17.02 <sup>180</sup>
30.5	60.047 <sup>141</sup>	38.84 <sup>259</sup>	40.385 <sup>208</sup>	32.28 <sup>158</sup>	56.290 <sup>164</sup>	63.11 <sup>12</sup>	13.497 <sup>144</sup>	19.07 <sup>205</sup>
May 10.5	60.145 <sup>98</sup>	41.58 <sup>274</sup>	40.555 <sup>170</sup>	33.81 <sup>153</sup>	56.427 <sup>137</sup>	63.12 <sup>1</sup>	13.606 <sup>109</sup>	21.28 <sup>221</sup>
20.5	60.200 <sup>55</sup>	44.37 <sup>279</sup>	40.686 <sup>131</sup>	35.27 <sup>146</sup>	56.533 <sup>106</sup>	63.03 <sup>9</sup>	13.680 <sup>74</sup>	23.57 <sup>229</sup>
June 30.5	60.212 <sup>12</sup>	47.13 <sup>276</sup>	40.777 <sup>91</sup>	36.63 <sup>136</sup>	56.609 <sup>76</sup>	62.84 <sup>19</sup>	13.719 <sup>39</sup>	25.87 <sup>230</sup>
9.4	60.183 <sup>29</sup>	49.76 <sup>263</sup>	40.826 <sup>49</sup>	37.87 <sup>124</sup>	56.654 <sup>45</sup>	62.60 <sup>24</sup>	13.724 <sup>5</sup>	28.10 <sup>223</sup>
19.4	60.113 <sup>70</sup>	52.19 <sup>243</sup>	40.832 <sup>6</sup>	38.95 <sup>108</sup>	56.666 <sup>12</sup>	62.32 <sup>28</sup>	13.695 <sup>29</sup>	30.18 <sup>208</sup>
29.4	60.006 <sup>107</sup>	54.35 <sup>216</sup>	40.797 <sup>35</sup>	39.86 <sup>91</sup>	56.647 <sup>19</sup>	61.99 <sup>33</sup>	13.633 <sup>62</sup>	32.07 <sup>157</sup>
July 9.4	59.865 <sup>141</sup>	56.21 <sup>186</sup>	40.722 <sup>75</sup>	40.56 <sup>70</sup>	56.598 <sup>49</sup>	61.62 <sup>37</sup>	13.541 <sup>92</sup>	33.72 <sup>165</sup>
19.3	59.692 <sup>173</sup>	57.69 <sup>148</sup>	40.610 <sup>112</sup>	41.06 <sup>50</sup>	56.519 <sup>79</sup>	61.23 <sup>39</sup>	13.420 <sup>121</sup>	35.10 <sup>138</sup>
29.3	59.493 <sup>199</sup>	58.77 <sup>106</sup>	40.465 <sup>145</sup>	41.31 <sup>25</sup>	56.416 <sup>103</sup>	60.82 <sup>41</sup>	13.275 <sup>145</sup>	36.16 <sup>106</sup>
Aug. 8.3	59.274 <sup>219</sup>	59.42 <sup>65</sup>	40.292 <sup>173</sup>	41.29 <sup>2</sup>	56.289 <sup>127</sup>	60.38 <sup>44</sup>	13.109 <sup>166</sup>	36.88 <sup>72</sup>
18.2	59.041 <sup>233</sup>	59.64 <sup>22</sup>	40.101 <sup>191</sup>	41.00 <sup>29</sup>	56.147 <sup>142</sup>	59.93 <sup>45</sup>	12.929 <sup>180</sup>	37.25 <sup>37</sup>
28.2	58.801 <sup>240</sup>	59.41 <sup>23</sup>	39.899 <sup>202</sup>	40.46 <sup>54</sup>	55.996 <sup>151</sup>	59.48 <sup>45</sup>	12.742 <sup>187</sup>	37.26 <sup>1</sup>
Sept. 7.2	58.562 <sup>239</sup>	58.73 <sup>68</sup>	39.697 <sup>202</sup>	39.66 <sup>80</sup>	55.844 <sup>152</sup>	59.03 <sup>45</sup>	12.554 <sup>188</sup>	36.90 <sup>36</sup>
17.2	58.335 <sup>227</sup>	57.61 <sup>112</sup>	39.507 <sup>190</sup>	38.65 <sup>101</sup>	55.699 <sup>145</sup>	58.61 <sup>42</sup>	12.374 <sup>180</sup>	36.17 <sup>73</sup>
27.1	58.129 <sup>206</sup>	56.06 <sup>155</sup>	39.340 <sup>167</sup>	37.43 <sup>122</sup>	55.572 <sup>127</sup>	58.24 <sup>37</sup>	12.212 <sup>162</sup>	35.07 <sup>110</sup>
Oct. 7.1	57.952 <sup>177</sup>	54.10 <sup>196</sup>	39.208 <sup>132</sup>	36.08 <sup>135</sup>	55.470 <sup>102</sup>	57.94 <sup>30</sup>	12.075 <sup>137</sup>	33.63 <sup>144</sup>
17.1	57.814 <sup>138</sup>	51.77 <sup>233</sup>	39.122 <sup>86</sup>	34.64 <sup>144</sup>	55.403 <sup>67</sup>	57.77 <sup>17</sup>	11.973 <sup>102</sup>	31.83 <sup>180</sup>
Nov. 27.1	57.724 <sup>90</sup>	49.10 <sup>267</sup>	39.090 <sup>32</sup>	33.19 <sup>145</sup>	55.378 <sup>25</sup>	57.73 <sup>4</sup>	11.912 <sup>61</sup>	29.72 <sup>211</sup>
6.0	57.688 <sup>36</sup>	46.14 <sup>296</sup>	39.120 <sup>30</sup>	31.79 <sup>140</sup>	55.401 <sup>23</sup>	57.85 <sup>12</sup>	11.899 <sup>13</sup>	27.33 <sup>239</sup>
16.0	57.710 <sup>22</sup>	42.96 <sup>318</sup>	39.214 <sup>94</sup>	30.52 <sup>127</sup>	55.475 <sup>74</sup>	58.17 <sup>32</sup>	11.939 <sup>40</sup>	24.69 <sup>264</sup>
26.0	57.794 <sup>84</sup>	39.63 <sup>333</sup>	39.372 <sup>158</sup>	29.43 <sup>109</sup>	55.601 <sup>126</sup>	58.69 <sup>52</sup>	12.032 <sup>93</sup>	21.89 <sup>280</sup>
Dec. 5.9	57.939 <sup>145</sup>	36.24 <sup>339</sup>	39.593 <sup>221</sup>	28.57 <sup>86</sup>	55.776 <sup>175</sup>	59.43 <sup>74</sup>	12.178 <sup>146</sup>	18.98 <sup>291</sup>
15.9	58.141 <sup>202</sup>	32.88 <sup>336</sup>	39.870 <sup>277</sup>	27.99 <sup>58</sup>	55.998 <sup>222</sup>	60.35 <sup>92</sup>	12.373 <sup>195</sup>	16.03 <sup>295</sup>
25.9	58.394 <sup>253</sup>	29.66 <sup>322</sup>	40.195 <sup>325</sup>	27.72 <sup>27</sup>	56.259 <sup>261</sup>	61.46 <sup>111</sup>	12.611 <sup>238</sup>	13.15 <sup>288</sup>
35.9	58.693 <sup>299</sup>	26.70 <sup>296</sup>	40.560 <sup>365</sup>	27.76 <sup>4</sup>	56.551 <sup>292</sup>	62.70 <sup>124</sup>	12.887 <sup>276</sup>	10.43 <sup>272</sup>
Mean Place	56.882	55.34	36.230	20.03	52.856	48.31	10.392	35.81
Sec $\delta$ , Tan $\delta$	1.327	+0.873	1.323	-0.866	1.033	-0.259	1.122	+0.509
$D\psi\alpha$ , $D_\omega\alpha$	+0.04	+0.04	+0.08	-0.04	+0.07	-0.01	+0.05	+0.02
$D\psi\delta$ , $D_\omega\delta$	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\zeta$ Cor. Bor. seq. Mag. 5.1		$\alpha$ Serpentina. Mag. 2.8		$\beta$ Serpentina. Mag. 3.7		$\kappa$ Serpentina. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 36	° ' " +36 53	h m 15 40	° ' " + 6 40	h m 15 42	° ' " +15 40	h m 15 45	° ' " +18 23
	s	"	s	"	s	"	s	"
Jan. 0.9	14.790	60.67	10.713	60.30	21.342	39.38	0.051	37.54
10.9	15.097 <sup>307</sup>	57.90 <sup>277</sup>	10.997 <sup>284</sup>	58.24 <sup>206</sup>	21.626 <sup>284</sup>	37.04 <sup>234</sup>	0.332 <sup>281</sup>	35.12 <sup>242</sup>
20.8	15.429 <sup>332</sup>	55.50 <sup>240</sup>	11.302 <sup>305</sup>	56.31 <sup>193</sup>	21.929 <sup>303</sup>	34.92 <sup>212</sup>	0.636 <sup>304</sup>	32.94 <sup>218</sup>
30.8	15.779 <sup>350</sup>	53.55 <sup>195</sup>	11.616 <sup>314</sup>	54.60 <sup>171</sup>	22.244 <sup>315</sup>	33.07 <sup>185</sup>	0.951 <sup>315</sup>	31.05 <sup>189</sup>
Feb. 9.8	16.135 <sup>356</sup>	52.14 <sup>141</sup>	11.932 <sup>316</sup>	53.14 <sup>146</sup>	22.562 <sup>318</sup>	31.58 <sup>149</sup>	1.271 <sup>320</sup>	29.55 <sup>150</sup>
	351	86	310	114	313	109	315	108
19.7	16.486	51.28	12.242	52.00	22.875	30.49	1.586	28.47
Mar. 1.7	16.825 <sup>339</sup>	51.01 <sup>27</sup>	12.539 <sup>297</sup>	51.22 <sup>78</sup>	23.176 <sup>301</sup>	29.84 <sup>65</sup>	1.890 <sup>304</sup>	27.84 <sup>63</sup>
11.7	17.143 <sup>318</sup>	51.33 <sup>32</sup>	12.820 <sup>281</sup>	50.79 <sup>43</sup>	23.462 <sup>286</sup>	29.63 <sup>21</sup>	2.178 <sup>288</sup>	27.69 <sup>15</sup>
21.7	17.434 <sup>291</sup>	52.20 <sup>87</sup>	13.080 <sup>260</sup>	50.74 <sup>5</sup>	23.726 <sup>264</sup>	29.85 <sup>22</sup>	2.445 <sup>267</sup>	27.99 <sup>30</sup>
31.6	17.695 <sup>261</sup>	53.58 <sup>138</sup>	13.318 <sup>238</sup>	51.03 <sup>29</sup>	23.966 <sup>240</sup>	30.48 <sup>63</sup>	2.689 <sup>244</sup>	28.71 <sup>72</sup>
	226	182	212	60	213	98	216	110
Apr. 10.6	17.921	55.40	13.530	51.63	24.179	31.46	2.905	29.81
20.6	18.110 <sup>189</sup>	57.58 <sup>218</sup>	13.716 <sup>186</sup>	52.49 <sup>86</sup>	24.365 <sup>186</sup>	32.76 <sup>130</sup>	3.093 <sup>188</sup>	31.22 <sup>141</sup>
30.6	18.260 <sup>150</sup>	60.01 <sup>243</sup>	13.873 <sup>157</sup>	53.56 <sup>107</sup>	24.521 <sup>156</sup>	34.29 <sup>153</sup>	3.250 <sup>157</sup>	32.90 <sup>168</sup>
May 10.5	18.369 <sup>109</sup>	62.63 <sup>262</sup>	14.002 <sup>129</sup>	54.80 <sup>124</sup>	24.647 <sup>126</sup>	36.01 <sup>172</sup>	3.377 <sup>127</sup>	34.74 <sup>184</sup>
20.5	18.438 <sup>69</sup>	65.31 <sup>268</sup>	14.102 <sup>100</sup>	56.14 <sup>134</sup>	24.742 <sup>95</sup>	37.82 <sup>181</sup>	3.472 <sup>185</sup>	36.68 <sup>194</sup>
	29	267	68	139	62	184	62	196
30.5	18.467	67.98	14.170	57.53	24.804	39.66	3.534	38.66
June 9.4	18.457 <sup>10</sup>	70.55 <sup>257</sup>	14.208 <sup>38</sup>	58.93 <sup>140</sup>	24.834 <sup>30</sup>	41.48 <sup>182</sup>	3.564 <sup>30</sup>	40.61 <sup>195</sup>
19.4	18.409 <sup>48</sup>	72.95 <sup>240</sup>	14.215 <sup>7</sup>	60.28 <sup>135</sup>	24.833 <sup>1</sup>	43.22 <sup>174</sup>	3.561 <sup>3</sup>	42.47 <sup>186</sup>
29.4	18.324 <sup>85</sup>	75.11 <sup>216</sup>	14.191 <sup>24</sup>	61.55 <sup>127</sup>	24.799 <sup>34</sup>	44.83 <sup>161</sup>	3.524 <sup>37</sup>	44.19 <sup>172</sup>
July 9.4	18.204 <sup>120</sup>	76.99 <sup>188</sup>	14.137 <sup>54</sup>	62.70 <sup>115</sup>	24.735 <sup>64</sup>	46.28 <sup>145</sup>	3.457 <sup>67</sup>	45.72 <sup>153</sup>
	151	153	82	102	92	123	96	132
19.3	18.053	78.52	14.055	63.72	24.643	47.51	3.361	47.04
29.3	17.877 <sup>176</sup>	79.67 <sup>115</sup>	13.947 <sup>108</sup>	64.58 <sup>86</sup>	24.524 <sup>119</sup>	48.53 <sup>102</sup>	3.238 <sup>123</sup>	48.10 <sup>106</sup>
Aug. 8.3	17.679 <sup>198</sup>	80.43 <sup>76</sup>	13.819 <sup>128</sup>	65.26 <sup>68</sup>	24.385 <sup>139</sup>	49.29 <sup>76</sup>	3.094 <sup>144</sup>	48.89 <sup>79</sup>
18.3	17.464 <sup>215</sup>	80.78 <sup>35</sup>	13.674 <sup>145</sup>	65.77 <sup>51</sup>	24.229 <sup>156</sup>	49.80 <sup>51</sup>	2.933 <sup>161</sup>	49.41 <sup>52</sup>
28.2	17.242 <sup>222</sup>	80.70 <sup>8</sup>	13.519 <sup>155</sup>	66.06 <sup>29</sup>	24.062 <sup>167</sup>	50.01 <sup>21</sup>	2.762 <sup>171</sup>	49.61 <sup>20</sup>
	223	52	157	9	168	6	174	10
Sept. 7.2	17.019	80.18	13.362	66.15	23.894	49.95	2.588	49.51
17.2	16.805 <sup>214</sup>	79.25 <sup>93</sup>	13.210 <sup>152</sup>	66.01 <sup>14</sup>	23.732 <sup>162</sup>	49.59 <sup>36</sup>	2.420 <sup>168</sup>	49.10 <sup>41</sup>
27.1	16.609 <sup>196</sup>	77.89 <sup>136</sup>	13.073 <sup>137</sup>	65.65 <sup>36</sup>	23.585 <sup>147</sup>	48.94 <sup>65</sup>	2.265 <sup>155</sup>	48.36 <sup>74</sup>
Oct. 7.1	16.440 <sup>169</sup>	76.13 <sup>176</sup>	12.959 <sup>114</sup>	65.04 <sup>61</sup>	23.458 <sup>127</sup>	47.97 <sup>97</sup>	2.133 <sup>132</sup>	47.31 <sup>105</sup>
17.1	16.308 <sup>132</sup>	74.00 <sup>213</sup>	12.877 <sup>82</sup>	64.20 <sup>84</sup>	23.363 <sup>95</sup>	46.72 <sup>125</sup>	2.033 <sup>100</sup>	45.96 <sup>135</sup>
	88	248	43	110	55	153	61	166
27.1	16.220	71.52	12.834	63.10	23.308	45.17	1.972	44.30
Nov. 6.0	16.183 <sup>37</sup>	68.76 <sup>276</sup>	12.835 <sup>1</sup>	61.77 <sup>133</sup>	23.299 <sup>9</sup>	43.37 <sup>180</sup>	1.956 <sup>16</sup>	42.38 <sup>192</sup>
16.0	16.201 <sup>18</sup>	65.75 <sup>301</sup>	12.885 <sup>50</sup>	60.20 <sup>157</sup>	23.338 <sup>39</sup>	41.33 <sup>204</sup>	1.990 <sup>34</sup>	40.20 <sup>218</sup>
26.0	16.278 <sup>77</sup>	62.58 <sup>317</sup>	12.984 <sup>99</sup>	58.44 <sup>176</sup>	23.428 <sup>90</sup>	39.09 <sup>224</sup>	2.075 <sup>85</sup>	37.83 <sup>237</sup>
Dec. 6.0	16.413 <sup>135</sup>	59.32 <sup>326</sup>	13.133 <sup>149</sup>	56.51 <sup>193</sup>	23.568 <sup>140</sup>	36.70 <sup>239</sup>	2.210 <sup>135</sup>	35.31 <sup>252</sup>
	191	325	104	204	187	248	183	260
15.9	16.604	56.07	13.327	54.47	23.755	34.22	2.393	32.71
25.9	16.844 <sup>240</sup>	52.92 <sup>315</sup>	13.560 <sup>233</sup>	52.37 <sup>210</sup>	23.984 <sup>229</sup>	31.74 <sup>248</sup>	2.619 <sup>226</sup>	30.13 <sup>258</sup>
35.9	17.125 <sup>281</sup>	49.99 <sup>293</sup>	13.826 <sup>266</sup>	50.28 <sup>209</sup>	24.247 <sup>263</sup>	29.33 <sup>241</sup>	2.880 <sup>261</sup>	27.63 <sup>250</sup>
Mean Place	15.152	76.73	10.702	69.49	21.414	50.67	0.164	49.35
Sec $\delta$ , Tan $\delta$	1.250	+0.751	1.007	+0.117	1.039	+0.281	1.054	+0.333
$D_{\delta} a$ , $D_{\delta} a$	+0.04	+0.03	+0.06	0.00	+0.05	+0.01	+0.05	+0.01
$D_{\delta} \delta$ , $D_{\delta} \delta$	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Serpentis. Mag. 3.6		$\eta$ H. Draconis. Mag. 5.1		$\epsilon$ Serpentis. Mag. 3.8		$\zeta$ Ursæ Minoris. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 45	° ' " - 3 10	h m 15 45	° ' " +62 50	h m 15 46	° ' " + 4 43	h m 15 46	° ' " +78 2
	s	"	s	"	s	"	s	"
Jan. 0.9	17.245	44.04	22.20	61.57	40.620	28.30	54.64	41.52
10.9	17.532 <sup>287</sup>	45.74 <sup>170</sup>	22.61 <sup>41</sup>	58.61 <sup>296</sup>	40.902 <sup>282</sup>	26.32 <sup>198</sup>	55.39 <sup>75</sup>	38.72 <sup>280</sup>
20.8	17.839 <sup>307</sup>	47.38 <sup>164</sup>	23.09 <sup>48</sup>	56.14 <sup>247</sup>	41.204 <sup>302</sup>	24.45 <sup>187</sup>	56.28 <sup>89</sup>	36.41 <sup>231</sup>
30.8	18.155 <sup>316</sup>	48.93 <sup>155</sup>	23.60 <sup>51</sup>	54.24 <sup>190</sup>	41.516 <sup>312</sup>	22.77 <sup>168</sup>	57.28 <sup>100</sup>	34.68 <sup>173</sup>
Feb. 9.8	18.473 <sup>318</sup>	50.32 <sup>189</sup>	24.13 <sup>53</sup>	52.95 <sup>129</sup>	41.831 <sup>315</sup>	21.32 <sup>145</sup>	58.34 <sup>106</sup>	33.58 <sup>110</sup>
	313	117	54	62	310	114	109	42
19.7	18.786	51.49	24.67	52.33	42.141	20.18	59.43	33.16
Mar. 1.7	19.086 <sup>300</sup>	52.40 <sup>91</sup>	25.20 <sup>53</sup>	52.41 <sup>8</sup>	42.440 <sup>299</sup>	19.37 <sup>81</sup>	60.50 <sup>107</sup>	33.41 <sup>25</sup>
11.7	19.372 <sup>286</sup>	53.04 <sup>64</sup>	25.71 <sup>51</sup>	53.14 <sup>73</sup>	42.724 <sup>284</sup>	18.90 <sup>47</sup>	61.52 <sup>102</sup>	34.33 <sup>92</sup>
21.7	19.638 <sup>266</sup>	53.42 <sup>38</sup>	26.17 <sup>46</sup>	54.50 <sup>136</sup>	42.987 <sup>263</sup>	18.78 <sup>12</sup>	62.46 <sup>94</sup>	35.86 <sup>153</sup>
31.6	19.882 <sup>244</sup>	53.51 <sup>9</sup>	26.58 <sup>41</sup>	56.43 <sup>198</sup>	43.230 <sup>243</sup>	19.00 <sup>22</sup>	63.28 <sup>82</sup>	37.93 <sup>207</sup>
	220	17	84	240	217	51	68	253
Apr. 10.6	20.102	53.34	26.92	58.83	43.447	19.51	63.96	40.46
20.6	20.297 <sup>195</sup>	52.97 <sup>37</sup>	27.19 <sup>27</sup>	61.60 <sup>277</sup>	43.639 <sup>192</sup>	20.29 <sup>78</sup>	64.46 <sup>50</sup>	43.34 <sup>288</sup>
30.6	20.464 <sup>167</sup>	52.42 <sup>55</sup>	27.39 <sup>30</sup>	64.65 <sup>305</sup>	43.803 <sup>164</sup>	21.28 <sup>99</sup>	64.80 <sup>34</sup>	46.46 <sup>312</sup>
May 10.5	20.605 <sup>141</sup>	51.71 <sup>71</sup>	27.51 <sup>12</sup>	67.85 <sup>320</sup>	43.940 <sup>137</sup>	22.43 <sup>115</sup>	64.94 <sup>14</sup>	49.71 <sup>326</sup>
20.5	20.715 <sup>110</sup>	50.91 <sup>80</sup>	27.55 <sup>4</sup>	71.11 <sup>326</sup>	44.046 <sup>106</sup>	23.68 <sup>125</sup>	64.92 <sup>2</sup>	52.98 <sup>327</sup>
	81	87	3	320	76	121	21	319
30.5	20.796 <sup>51</sup>	50.04 <sup>89</sup>	27.52	74.31 <sup>304</sup>	44.122 <sup>46</sup>	24.99 <sup>132</sup>	64.71 <sup>39</sup>	56.17 <sup>290</sup>
June 9.4	20.847 <sup>18</sup>	49.15 <sup>89</sup>	27.41 <sup>11</sup>	77.35 <sup>281</sup>	44.168 <sup>14</sup>	26.31 <sup>128</sup>	64.32 <sup>54</sup>	59.16 <sup>273</sup>
19.4	20.865 <sup>13</sup>	48.26 <sup>87</sup>	27.22 <sup>19</sup>	80.16 <sup>249</sup>	44.182 <sup>18</sup>	27.59 <sup>122</sup>	63.78 <sup>68</sup>	61.89 <sup>240</sup>
29.4	20.852 <sup>43</sup>	47.39 <sup>82</sup>	26.98 <sup>80</sup>	82.65 <sup>210</sup>	44.164 <sup>48</sup>	28.81 <sup>111</sup>	63.10 <sup>82</sup>	64.29 <sup>199</sup>
July 9.4	20.809 <sup>74</sup>	46.57 <sup>75</sup>	26.68 <sup>86</sup>	84.75 <sup>167</sup>	44.116 <sup>77</sup>	29.92 <sup>99</sup>	62.28 <sup>92</sup>	66.28 <sup>154</sup>
19.3	20.735 <sup>90</sup>	45.82 <sup>66</sup>	26.32 <sup>40</sup>	86.42 <sup>121</sup>	44.039 <sup>103</sup>	30.91 <sup>85</sup>	61.36 <sup>100</sup>	67.82 <sup>106</sup>
29.3	20.636 <sup>123</sup>	45.16 <sup>58</sup>	25.92 <sup>42</sup>	87.63 <sup>71</sup>	43.936 <sup>126</sup>	31.76 <sup>68</sup>	60.36 <sup>107</sup>	68.87 <sup>55</sup>
Aug. 8.3	20.513 <sup>139</sup>	44.58 <sup>49</sup>	25.50 <sup>45</sup>	88.34 <sup>20</sup>	43.810 <sup>143</sup>	32.44 <sup>52</sup>	59.29 <sup>110</sup>	69.42 <sup>3</sup>
18.3	20.374 <sup>150</sup>	44.09 <sup>38</sup>	25.05 <sup>47</sup>	88.54 <sup>32</sup>	43.667 <sup>154</sup>	32.96 <sup>34</sup>	58.19 <sup>111</sup>	69.45 <sup>51</sup>
28.2	20.224 <sup>154</sup>	43.71 <sup>26</sup>	24.58 <sup>46</sup>	88.22 <sup>84</sup>	43.513 <sup>158</sup>	33.30 <sup>13</sup>	57.08 <sup>111</sup>	68.94 <sup>101</sup>
Sept. 7.2	20.070	43.46	24.12	87.38	43.355	33.43	55.97	67.93
17.2	19.921 <sup>149</sup>	43.34 <sup>12</sup>	23.68 <sup>44</sup>	86.04 <sup>134</sup>	43.202 <sup>153</sup>	33.37 <sup>6</sup>	54.90 <sup>107</sup>	66.43 <sup>150</sup>
27.1	19.785 <sup>136</sup>	43.36 <sup>2</sup>	23.26 <sup>42</sup>	84.21 <sup>183</sup>	43.063 <sup>139</sup>	33.08 <sup>29</sup>	53.90 <sup>100</sup>	64.45 <sup>198</sup>
Oct. 7.1	19.673 <sup>112</sup>	43.55 <sup>19</sup>	22.89 <sup>37</sup>	81.92 <sup>229</sup>	42.946 <sup>117</sup>	32.58 <sup>80</sup>	53.00 <sup>90</sup>	62.04 <sup>241</sup>
17.1	19.592 <sup>81</sup>	43.92 <sup>37</sup>	22.57 <sup>32</sup>	79.22 <sup>270</sup>	42.860 <sup>86</sup>	31.85 <sup>73</sup>	52.20 <sup>80</sup>	59.25 <sup>279</sup>
	41	56	25	305	48	97	64	314
27.1	19.551	44.48	22.32	76.17	42.812	30.88	51.56	56.11
Nov. 6.0	19.554 <sup>3</sup>	45.25 <sup>77</sup>	22.16 <sup>16</sup>	72.82 <sup>335</sup>	42.809 <sup>3</sup>	29.66 <sup>122</sup>	51.06 <sup>50</sup>	52.71 <sup>340</sup>
16.0	19.605 <sup>102</sup>	46.22 <sup>97</sup>	22.08 <sup>8</sup>	69.24 <sup>358</sup>	42.854 <sup>45</sup>	28.24 <sup>142</sup>	50.75 <sup>31</sup>	49.10 <sup>361</sup>
26.0	19.707 <sup>151</sup>	47.40 <sup>118</sup>	22.09 <sup>1</sup>	65.54 <sup>370</sup>	42.949 <sup>95</sup>	26.60 <sup>164</sup>	50.63 <sup>12</sup>	45.40 <sup>370</sup>
Dec. 6.0	19.858 <sup>197</sup>	48.76 <sup>136</sup>	22.19 <sup>10</sup>	61.80 <sup>374</sup>	43.093 <sup>144</sup>	24.80 <sup>180</sup>	50.71 <sup>8</sup>	41.70 <sup>370</sup>
		151	20	367	188	193	28	358
15.9	20.055	50.27	22.39	58.13	43.281	22.87	50.99	38.12
25.9	20.290 <sup>235</sup>	51.90 <sup>163</sup>	22.68 <sup>29</sup>	54.65 <sup>348</sup>	43.510 <sup>229</sup>	20.87 <sup>200</sup>	51.47 <sup>48</sup>	34.74 <sup>338</sup>
35.9	20.559 <sup>269</sup>	53.58 <sup>168</sup>	23.06 <sup>38</sup>	51.46 <sup>319</sup>	43.773 <sup>263</sup>	18.87 <sup>200</sup>	52.13 <sup>66</sup>	31.69 <sup>306</sup>
Mean Place	17.206	37.38	23.868	80.66	40.625	36.86	59.691	61.37
Sec $\delta$ , Tan $\delta$	1.002	-0.056	2.192	+1.950	1.003	+0.083	4.829	+4.724
$D\psi\alpha$ , $D\omega\alpha$	+0.06	0.00	+0.02	+0.07	+0.06	0.00	-0.04	+0.17
$D\psi\delta$ , $D\omega\delta$	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Triang. Aust. Mag. 3.0		$\lambda$ Libræ. Mag. 5.1		$\gamma$ Serpentis. Mag. 3.9		$\pi$ Scorpii. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 47	° ' " -63 10	h m 15 48	° ' " -19 55	h m 15 52	° ' " +15 55	h m 15 53	° ' " -25 52
	s	"	s	"	s	"	s	"
Jan. 0.9	48.34	27.12	30.797	14.59	36.984	43.28	49.657	35.36
10.9	48.91	26.26	31.107	15.58	37.260	40.90	49.974	36.05
20.8	49.52	25.83	31.435	16.67	37.559	38.73	50.313	36.89
30.8	50.16	25.82	31.773	17.83	37.871	36.82	50.665	37.85
Feb. 9.8	50.81	26.24	32.113	18.99	38.187	35.28	51.019	38.88
19.7	51.45	27.05	32.449	20.13	38.501	34.13	51.368	39.94
Mar. 1.7	52.08	28.23	32.773	21.20	38.805	33.42	51.707	41.00
11.7	52.68	29.72	33.080	22.17	39.095	33.15	52.030	42.04
21.7	53.24	31.51	33.369	23.02	39.365	33.32	52.333	43.01
31.6	53.76	33.53	33.634	23.74	39.611	33.91	52.615	43.91
Apr. 10.6	54.22	35.74	33.875	24.33	39.833	34.87	52.871	44.74
20.6	54.64	38.10	34.090	24.81	40.028	36.14	53.102	45.47
30.6	54.99	40.56	34.279	25.17	40.194	37.66	53.304	46.13
May 10.5	55.27	43.07	34.438	25.42	40.330	39.37	53.476	46.71
20.5	55.49	45.59	34.566	25.59	40.434	41.18	53.617	47.22
30.5	55.64	48.06	34.663	25.70	40.506	43.03	53.723	47.66
June 9.4	55.71	50.42	34.726	25.74	40.546	44.87	53.794	48.03
19.4	55.70	52.61	34.755	25.72	40.553	46.64	53.829	48.33
29.4	55.62	54.60	34.751	25.64	40.527	48.27	53.829	48.55
July 9.4	55.47	56.30	34.712	25.51	40.469	49.75	53.794	48.70
19.3	55.26	57.69	34.640	25.32	40.382	51.02	53.722	48.74
29.3	54.98	58.71	34.540	25.07	40.267	52.06	53.619	48.68
Aug. 8.3	54.66	59.33	34.415	24.76	40.130	52.85	53.489	48.51
18.3	54.30	59.51	34.271	24.40	39.975	53.38	53.338	48.22
28.2	53.93	59.26	34.114	23.98	39.807	53.61	53.172	47.83
Sept. 7.2	53.55	58.56	33.952	23.51	39.636	53.56	53.002	47.33
17.2	53.18	57.43	33.795	23.01	39.470	53.21	52.836	46.73
27.1	52.85	55.91	33.653	22.51	39.315	52.56	52.685	46.07
Oct. 7.1	52.57	54.06	33.536	22.03	39.182	51.62	52.559	45.38
17.1	52.37	51.92	33.453	21.60	39.080	50.37	52.467	44.69
27.1	52.25	49.60	33.412	21.26	39.016	48.83	52.419	44.04
Nov. 6.0	52.22	47.19	33.419	21.05	38.996	47.02	52.422	43.48
16.0	52.31	44.77	33.478	20.99	39.024	44.96	52.478	43.05
26.0	52.49	42.45	33.590	21.12	39.104	42.71	52.591	42.80
Dec. 6.0	52.78	40.32	33.754	21.46	39.234	40.30	52.757	42.73
15.9	53.15	38.46	33.967	21.98	39.412	37.80	52.974	42.89
25.9	53.61	36.94	34.222	22.71	39.632	35.29	53.235	43.24
35.9	54.15	35.81	34.510	23.59	39.888	32.83	53.533	43.79
Mean Place	49.006	32.92	30.751	12.01	37.106	54.25	49.642	34.10
Sec $\delta$ , Tan $\delta$	2.216	-1.978	1.064	-0.362	1.040	+0.285	1.111	-0.485
$D\psi a$ , $D_m a$	+0.10	-0.07	+0.07	-0.01	+0.05	+0.01	+0.07	-0.02
$D\psi \delta$ , $D_m \delta$	-0.2	-0.8	-0.2	-0.8	-0.2	-0.8	-0.2	-0.9

## APPARENT PLACES OF STARS, 1917.

443

**FOR THE UPPER TRANSIT AT WASHINGTON.**

Washington Mean Time.	$\delta$ Coronæ Borealis. Mag. 4.2		$\delta$ Scorpii. Mag. 2.5		$\theta$ Draconis. Mag. 4.1		$\beta$ Scorpii. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 15 54	" ' ° +27 6	h m 15 55	" ' ° -22 23	h m 16 0	" ' ° +58 46	h m 16 0	" ' ° -19 34
	s "	"	s "	"	s "	"	s "	"
Jan. 0.9	8.730	49.64	25.349	13.25	18.492	54.19	36.445	47.72
10.9	9.009 <sup>279</sup>	46.99 <sup>265</sup>	25.658 <sup>309</sup>	14.08 <sup>83</sup>	18.850 <sup>358</sup>	51.14 <sup>305</sup>	36.746 <sup>301</sup>	48.65 <sup>93</sup>
20.8	9.314 <sup>305</sup>	44.62 <sup>237</sup>	25.988 <sup>330</sup>	15.02 <sup>94</sup>	19.261 <sup>411</sup>	48.52 <sup>262</sup>	37.067 <sup>321</sup>	49.67 <sup>102</sup>
30.8	9.635 <sup>321</sup>	42.62 <sup>200</sup>	26.330 <sup>342</sup>	16.08 <sup>106</sup>	19.712 <sup>451</sup>	46.44 <sup>208</sup>	37.400 <sup>333</sup>	50.75 <sup>108</sup>
Feb. 9.8	9.963 <sup>328</sup>	41.06 <sup>156</sup>	26.675 <sup>345</sup>	17.16 <sup>108</sup>	20.187 <sup>475</sup>	44.96 <sup>148</sup>	37.738 <sup>338</sup>	51.84 <sup>109</sup>
	327	106	340	107	484	83	335	106
19.8	10.290	40.00	27.015	18.23	20.671	44.13	38.073	52.90
Mar. 1.7	10.609 <sup>319</sup>	39.46 <sup>54</sup>	27.346 <sup>331</sup>	19.26 <sup>103</sup>	21.150 <sup>479</sup>	43.98 <sup>15</sup>	38.399 <sup>326</sup>	53.88 <sup>98</sup>
11.7	10.911 <sup>302</sup>	39.47 <sup>1</sup>	27.662 <sup>316</sup>	20.23 <sup>97</sup>	21.610 <sup>460</sup>	44.51 <sup>53</sup>	38.709 <sup>310</sup>	54.77 <sup>89</sup>
21.7	11.192 <sup>281</sup>	39.98 <sup>51</sup>	27.958 <sup>296</sup>	21.10 <sup>87</sup>	22.036 <sup>426</sup>	45.66 <sup>115</sup>	39.003 <sup>294</sup>	55.53 <sup>76</sup>
31.6	11.450 <sup>258</sup>	40.97 <sup>99</sup>	28.233 <sup>275</sup>	21.87 <sup>77</sup>	22.420 <sup>384</sup>	47.40 <sup>174</sup>	39.276 <sup>273</sup>	56.16 <sup>63</sup>
	230	141	251	65	331	225	250	51
Apr. 10.6	11.680	42.38	28.484	22.52	22.751	49.65	39.526	56.67
20.6	11.878 <sup>198</sup>	44.16 <sup>178</sup>	28.710 <sup>226</sup>	23.08 <sup>56</sup>	23.024 <sup>273</sup>	52.30 <sup>265</sup>	39.752 <sup>226</sup>	57.07 <sup>40</sup>
30.6	12.043 <sup>165</sup>	46.22 <sup>206</sup>	28.908 <sup>198</sup>	23.54 <sup>46</sup>	23.235 <sup>211</sup>	55.27 <sup>297</sup>	39.951 <sup>199</sup>	57.35 <sup>28</sup>
May 10.5	12.175 <sup>132</sup>	48.46 <sup>224</sup>	29.077 <sup>169</sup>	23.92 <sup>38</sup>	23.378 <sup>143</sup>	58.43 <sup>316</sup>	40.122 <sup>171</sup>	57.53 <sup>18</sup>
20.5	12.274 <sup>99</sup>	50.81 <sup>235</sup>	29.216 <sup>139</sup>	24.22 <sup>30</sup>	23.455 <sup>77</sup>	61.68 <sup>325</sup>	40.263 <sup>141</sup>	57.65 <sup>12</sup>
	62	239	106	22	9	323	108	5
30.5	12.336	53.20	29.322	24.44	23.464	64.91	40.371	57.70
June 9.5	12.361 <sup>25</sup>	55.54 <sup>234</sup>	29.393 <sup>71</sup>	24.61 <sup>17</sup>	23.405 <sup>59</sup>	68.03 <sup>312</sup>	40.446 <sup>75</sup>	57.70 <sup>0</sup>
19.4	12.351 <sup>10</sup>	57.77 <sup>223</sup>	29.429 <sup>36</sup>	24.72 <sup>11</sup>	23.283 <sup>122</sup>	70.95 <sup>292</sup>	40.486 <sup>40</sup>	57.65 <sup>6</sup>
29.4	12.306 <sup>45</sup>	59.81 <sup>204</sup>	29.430 <sup>1</sup>	24.77 <sup>5</sup>	23.101 <sup>182</sup>	73.58 <sup>263</sup>	40.491 <sup>5</sup>	57.55 <sup>10</sup>
July 9.4	12.227 <sup>79</sup>	61.63 <sup>182</sup>	29.395 <sup>35</sup>	24.75 <sup>2</sup>	22.865 <sup>236</sup>	75.87 <sup>229</sup>	40.461 <sup>30</sup>	57.42 <sup>13</sup>
	111	155	68	8	288	189	64	19
19.3	12.116	63.18	29.327	24.67	22.577	77.76	40.397	57.23
29.3	11.978 <sup>138</sup>	64.42 <sup>124</sup>	29.227 <sup>100</sup>	24.52 <sup>15</sup>	22.248 <sup>329</sup>	79.20 <sup>144</sup>	40.303 <sup>94</sup>	56.99 <sup>24</sup>
Aug. 8.3	11.815 <sup>163</sup>	65.34 <sup>92</sup>	29.102 <sup>125</sup>	24.27 <sup>25</sup>	21.884 <sup>364</sup>	80.17 <sup>97</sup>	40.181 <sup>122</sup>	56.71 <sup>28</sup>
18.3	11.635 <sup>180</sup>	65.90 <sup>56</sup>	28.956 <sup>146</sup>	23.95 <sup>32</sup>	21.496 <sup>388</sup>	80.62 <sup>45</sup>	40.038 <sup>153</sup>	56.38 <sup>33</sup>
28.2	11.443 <sup>192</sup>	66.09 <sup>19</sup>	28.794 <sup>162</sup>	23.56 <sup>39</sup>	21.093 <sup>403</sup>	80.58 <sup>4</sup>	39.880 <sup>148</sup>	56.00 <sup>38</sup>
	196	18	166	47	405	56	164	43
Sept. 7.2	11.247	65.91	28.628	23.09	20.688	80.02	39.716	55.57
17.2	11.055 <sup>192</sup>	65.35 <sup>56</sup>	28.467 <sup>161</sup>	22.56 <sup>53</sup>	20.292 <sup>396</sup>	78.95 <sup>107</sup>	39.555 <sup>161</sup>	55.12 <sup>45</sup>
27.2	10.876 <sup>179</sup>	64.43 <sup>92</sup>	28.319 <sup>148</sup>	22.00 <sup>56</sup>	19.917 <sup>375</sup>	77.39 <sup>156</sup>	39.408 <sup>147</sup>	54.65 <sup>47</sup>
Oct. 7.1	10.721 <sup>155</sup>	63.13 <sup>130</sup>	28.196 <sup>123</sup>	21.44 <sup>56</sup>	19.578 <sup>339</sup>	75.36 <sup>203</sup>	39.282 <sup>126</sup>	54.21 <sup>44</sup>
17.1	10.598 <sup>123</sup>	61.47 <sup>166</sup>	28.105 <sup>91</sup>	20.91 <sup>53</sup>	19.285 <sup>293</sup>	72.90 <sup>246</sup>	39.190 <sup>92</sup>	53.81 <sup>40</sup>
	84	199	48	47	232	284	52	32
27.1	10.514	59.48	28.057	20.44	19.053	70.06	39.138	53.49
Nov. 6.0	10.476 <sup>38</sup>	57.20 <sup>228</sup>	28.059 <sup>2</sup>	20.08 <sup>36</sup>	18.888 <sup>165</sup>	66.88 <sup>318</sup>	39.133 <sup>5</sup>	53.30 <sup>19</sup>
16.0	10.489 <sup>13</sup>	54.65 <sup>255</sup>	28.112 <sup>53</sup>	19.87 <sup>21</sup>	18.801 <sup>87</sup>	63.44 <sup>344</sup>	39.181 <sup>48</sup>	53.24 <sup>6</sup>
26.0	10.555 <sup>66</sup>	51.90 <sup>275</sup>	28.220 <sup>108</sup>	19.83 <sup>4</sup>	18.797 <sup>4</sup>	59.84 <sup>360</sup>	39.281 <sup>100</sup>	53.36 <sup>12</sup>
Dec. 6.0	10.675 <sup>120</sup>	49.02 <sup>288</sup>	28.380 <sup>160</sup>	19.99 <sup>16</sup>	18.878 <sup>81</sup>	56.15 <sup>369</sup>	39.433 <sup>152</sup>	53.67 <sup>31</sup>
	171	293	210	35	164	366	201	49
15.9	10.846	46.09	28.590	20.34	19.042	52.49	39.634	54.16
25.9	11.063 <sup>217</sup>	43.19 <sup>290</sup>	28.843 <sup>253</sup>	20.88 <sup>54</sup>	19.287 <sup>245</sup>	48.98 <sup>351</sup>	39.878 <sup>244</sup>	54.85 <sup>69</sup>
35.9	11.319 <sup>256</sup>	40.42 <sup>277</sup>	29.131 <sup>288</sup>	21.60 <sup>72</sup>	19.603 <sup>316</sup>	45.72 <sup>326</sup>	40.156 <sup>278</sup>	55.67 <sup>82</sup>
Mean Place	9.009	62.90	25.331	11.19	19.978	71.79	36.440	45.00
Sec $\delta$ , Tan $\delta$	1.123	+0.512	1.082	-0.412	1.929	+1.650	1.061	-0.356
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.05	+0.02	+0.07	-0.01	+0.02	+0.06	+0.07	-0.01
D $\psi$ $\delta$ , D $\omega$ $\delta$	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Herculis. Mag. 5.3			Groombridge 2330. Mag. 5.4			$\phi$ Herculis. Mag. 4.3			$\delta^1$ Apodis. Mag. 4.8		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "
	16 4		+17 15	16 6		+68 1	16 6		+45 8	16 7		-78 29
		s	"		s	"		s	"		s	"
Jan. 0.9	19.448		50.62	2.89		25.14	8.463		51.56	50.83		13.98
10.9	19.716 <sup>268</sup>		48.22 <sup>240</sup>	3.32 <sup>43</sup>		22.07 <sup>307</sup>	8.759 <sup>296</sup>		48.56 <sup>300</sup>	51.95 <sup>112</sup>		12.30 <sup>168</sup>
20.8	20.007 <sup>291</sup>		46.03 <sup>219</sup>	3.84 <sup>52</sup>		19.45 <sup>262</sup>	9.091 <sup>332</sup>		45.92 <sup>264</sup>	53.18 <sup>123</sup>		11.10 <sup>120</sup>
30.8	20.315 <sup>308</sup>		44.13 <sup>190</sup>	4.41 <sup>57</sup>		17.38 <sup>207</sup>	9.452 <sup>361</sup>		43.75 <sup>217</sup>	54.49 <sup>131</sup>		10.38 <sup>72</sup>
Feb. 9.8	20.628 <sup>313</sup>		42.58 <sup>165</sup>	5.03 <sup>62</sup>		15.93 <sup>145</sup>	9.828 <sup>376</sup>		42.12 <sup>163</sup>	55.85 <sup>136</sup>		10.16 <sup>22</sup>
		314	114		63	79		382	102		138	28
19.8	20.942		41.44	5.66		15.14	10.210		41.10	57.23		10.44
Mar. 1.7	21.248 <sup>306</sup>		40.75 <sup>69</sup>	6.30 <sup>64</sup>		15.02 <sup>12</sup>	10.586 <sup>376</sup>		40.71 <sup>39</sup>	58.59 <sup>136</sup>		11.19 <sup>75</sup>
11.7	21.542 <sup>294</sup>		40.52 <sup>23</sup>	6.90 <sup>60</sup>		15.59 <sup>57</sup>	10.948 <sup>362</sup>		40.95 <sup>24</sup>	59.92 <sup>133</sup>		12.39 <sup>120</sup>
21.7	21.817 <sup>275</sup>		40.74 <sup>22</sup>	7.47 <sup>57</sup>		16.81 <sup>122</sup>	11.286 <sup>338</sup>		41.80 <sup>85</sup>	61.18 <sup>126</sup>		13.99 <sup>160</sup>
31.6	22.073 <sup>256</sup>		41.38 <sup>64</sup>	7.99 <sup>52</sup>		18.61 <sup>180</sup>	11.594 <sup>308</sup>		43.22 <sup>142</sup>	62.34 <sup>116</sup>		15.96 <sup>197</sup>
		229	104		44	232		273	191		107	228
Apr. 10.6	22.302		42.42	8.43		20.93	11.867		45.13	63.41		18.24
20.6	22.506 <sup>204</sup>		43.78 <sup>136</sup>	8.79 <sup>36</sup>		23.65 <sup>272</sup>	12.102 <sup>235</sup>		47.46 <sup>233</sup>	64.35 <sup>94</sup>		20.78 <sup>254</sup>
30.6	22.682 <sup>176</sup>		45.40 <sup>162</sup>	9.06 <sup>27</sup>		26.68 <sup>303</sup>	12.293 <sup>191</sup>		50.11 <sup>265</sup>	65.16 <sup>81</sup>		23.52 <sup>274</sup>
May 10.5	22.828 <sup>146</sup>		47.22 <sup>182</sup>	9.23 <sup>17</sup>		29.90 <sup>322</sup>	12.438 <sup>145</sup>		52.97 <sup>286</sup>	65.81 <sup>65</sup>		26.41 <sup>289</sup>
20.5	22.942 <sup>114</sup>		49.16 <sup>194</sup>	9.30 <sup>7</sup>		33.22 <sup>332</sup>	12.536 <sup>98</sup>		55.95 <sup>298</sup>	66.30 <sup>49</sup>		29.38 <sup>297</sup>
		82	200		2	331		50	301		32	300
30.5	23.024		51.16	9.28		36.53	12.586		58.96	66.62		32.38
June 9.5	23.072 <sup>48</sup>		53.14 <sup>198</sup>	9.17 <sup>11</sup>		39.71 <sup>318</sup>	12.589 <sup>3</sup>		61.90 <sup>294</sup>	66.75 <sup>13</sup>		35.32 <sup>294</sup>
19.4	23.086 <sup>14</sup>		55.04 <sup>190</sup>	8.96 <sup>21</sup>		42.66 <sup>295</sup>	12.545 <sup>44</sup>		64.68 <sup>278</sup>	66.72 <sup>3</sup>		38.14 <sup>282</sup>
29.4	23.065 <sup>21</sup>		56.83 <sup>179</sup>	8.67 <sup>29</sup>		45.35 <sup>269</sup>	12.456 <sup>89</sup>		67.23 <sup>255</sup>	66.50 <sup>22</sup>		40.75 <sup>261</sup>
July 9.4	23.013 <sup>52</sup>		58.44 <sup>161</sup>	8.30 <sup>37</sup>		47.68 <sup>233</sup>	12.324 <sup>132</sup>		69.47 <sup>224</sup>	66.12 <sup>38</sup>		43.10 <sup>235</sup>
		84	141		44	191		171	191		53	201
19.3	22.929		59.85	7.86		49.59	12.153		71.38	65.59		45.11
29.3	22.815 <sup>114</sup>		61.01 <sup>116</sup>	7.38 <sup>48</sup>		51.02 <sup>143</sup>	11.946 <sup>207</sup>		72.89 <sup>151</sup>	64.92 <sup>67</sup>		46.73 <sup>162</sup>
Aug. 8.3	22.679 <sup>136</sup>		61.91 <sup>90</sup>	6.83 <sup>55</sup>		51.99 <sup>97</sup>	11.712 <sup>234</sup>		73.96 <sup>107</sup>	64.12 <sup>80</sup>		47.89 <sup>116</sup>
18.3	22.521 <sup>158</sup>		62.54 <sup>63</sup>	6.26 <sup>57</sup>		52.43 <sup>44</sup>	11.455 <sup>257</sup>		74.58 <sup>62</sup>	63.24 <sup>88</sup>		48.55 <sup>66</sup>
28.2	22.349 <sup>172</sup>		62.88 <sup>34</sup>	5.67 <sup>59</sup>		52.37 <sup>6</sup>	11.184 <sup>271</sup>		74.74 <sup>16</sup>	62.32 <sup>92</sup>		48.68 <sup>13</sup>
		177	2		59	60		276	31		94	41
Sept. 7.2	22.172		62.90	5.08		51.77	10.908		74.43	61.38		48.27
17.2	21.997 <sup>175</sup>		62.64 <sup>26</sup>	4.50 <sup>58</sup>		50.65 <sup>112</sup>	10.634 <sup>274</sup>		73.65 <sup>78</sup>	60.46 <sup>92</sup>		47.32 <sup>95</sup>
27.2	21.833 <sup>164</sup>		62.05 <sup>59</sup>	3.94 <sup>56</sup>		49.05 <sup>160</sup>	10.377 <sup>257</sup>		72.39 <sup>126</sup>	59.60 <sup>86</sup>		45.86 <sup>146</sup>
Oct. 7.1	21.690 <sup>143</sup>		61.14 <sup>91</sup>	3.44 <sup>50</sup>		46.95 <sup>210</sup>	10.144 <sup>233</sup>		70.69 <sup>170</sup>	58.86 <sup>74</sup>		43.93 <sup>193</sup>
17.1	21.576 <sup>114</sup>		59.93 <sup>121</sup>	2.99 <sup>45</sup>		44.43 <sup>252</sup>	9.948 <sup>196</sup>		68.56 <sup>213</sup>	58.25 <sup>61</sup>		41.62 <sup>231</sup>
		77	151		37	291		152	251		43	265
27.1	21.499		58.42	2.62		41.52	9.796		66.05	57.82		38.97
Nov. 6.0	21.467 <sup>32</sup>		56.63 <sup>179</sup>	2.34 <sup>28</sup>		38.27 <sup>325</sup>	9.698 <sup>98</sup>		63.21 <sup>284</sup>	57.60 <sup>22</sup>		36.11 <sup>266</sup>
16.0	21.482 <sup>15</sup>		54.59 <sup>204</sup>	2.17 <sup>17</sup>		34.78 <sup>349</sup>	9.659 <sup>39</sup>		60.08 <sup>313</sup>	57.59 <sup>1</sup>		33.13 <sup>298</sup>
26.0	21.547 <sup>65</sup>		52.33 <sup>226</sup>	2.10 <sup>7</sup>		31.12 <sup>366</sup>	9.683 <sup>24</sup>		56.76 <sup>332</sup>	57.81 <sup>22</sup>		30.15 <sup>296</sup>
Dec. 6.0	21.663 <sup>116</sup>		49.92 <sup>241</sup>	2.15 <sup>5</sup>		27.39 <sup>373</sup>	9.773 <sup>90</sup>		53.31 <sup>345</sup>	58.25 <sup>44</sup>		27.28 <sup>287</sup>
		165	250		16	369		153	346		66	265
15.9	21.828		47.42	2.31		23.70	9.926		49.85	58.91		24.63
25.9	22.036 <sup>208</sup>		44.89 <sup>253</sup>	2.58 <sup>27</sup>		20.16 <sup>354</sup>	10.139 <sup>213</sup>		46.47 <sup>338</sup>	59.75 <sup>84</sup>		22.28 <sup>235</sup>
35.9	22.281 <sup>245</sup>		42.41 <sup>248</sup>	2.96 <sup>38</sup>		16.88 <sup>328</sup>	10.404 <sup>265</sup>		43.29 <sup>318</sup>	60.78 <sup>103</sup>		20.32 <sup>196</sup>
Mean Place	19.637		61.45	5.472		43.00	9.264		67.12	53.722		20.42
Sec $\delta$ , Tan $\delta$	1.047		+0.311	2.672		+2.478	1.418		+1.005	5.012		-4.911
$D\alpha$ , $D\alpha$	+0.05		+0.01	0.00		+0.08	+0.04		+0.03	+0.18		-0.16
$D\delta$ , $D\delta$	-0.2		-0.9	-0.2		-0.9	-0.2		-0.9	-0.2		-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Ophiuchi. Mag. 3.0		$\sigma$ Cor. Bor. seq. Mag. 5.8		19 Ursæ Minoris. Mag. 5.5		$\gamma^2$ Normæ. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 9	° ' " - 3 28	h m 16 11	° ' " +34 3	h m 16 13	° ' " +76 4	h m 16 13	° ' " -49 57
	s	"	s	"	s	"	s	"
Jan. 0.9	59.604	59.44	33.679	52.84	5.63	55.52	36.877	8.37
10.9	59.875	61.05	33.950	49.98	6.20	52.49	37.279	7.77
20.8	60.170	62.62	34.253	47.44	6.92	49.90	37.716	7.48
30.8	60.479	64.09	34.577	45.29	7.74	47.84	38.175	7.49
Feb. 9.8	60.792	65.40	34.913	43.62	8.63	46.39	38.645	7.82
19.8	61.105	66.50	35.253	42.49	9.57	45.59	39.116	8.43
Mar. 1.7	61.409	67.37	35.588	41.93	10.51	45.48	39.579	9.27
11.7	61.703	67.96	35.911	41.95	11.43	46.05	40.027	10.33
21.7	61.981	68.27	36.214	42.54	12.29	47.25	40.455	11.59
31.7	62.240	68.33	36.495	43.65	13.07	49.04	40.855	12.99
Apr. 10.6	62.480	68.12	36.746	45.23	13.73	51.34	41.226	14.53
20.6	62.693	67.70	36.966	47.22	14.27	54.05	41.562	16.18
30.6	62.883	67.08	37.152	49.51	14.67	57.08	41.860	17.89
May 10.5	63.046	66.33	37.300	52.03	14.90	60.30	42.116	19.65
20.5	63.181	65.48	37.411	54.68	14.99	63.61	42.326	21.42
30.5	63.285	64.56	37.483	57.38	14.92	66.90	42.487	23.17
June 9.5	63.358	63.62	37.514	60.04	14.70	70.08	42.597	24.87
19.4	63.397	62.68	37.506	62.57	14.33	73.04	42.653	26.46
29.4	63.403	61.77	37.459	64.93	13.83	75.72	42.654	27.92
July 9.4	63.376	60.92	37.373	67.03	13.21	78.05	42.602	29.22
19.4	63.316	60.14	37.252	68.85	12.48	79.96	42.498	30.29
29.3	63.227	59.44	37.100	70.32	11.66	81.42	42.347	31.10
Aug. 8.3	63.111	58.84	36.921	71.42	10.77	82.39	42.155	31.64
18.3	62.975	58.34	36.719	72.13	9.84	82.84	41.930	31.86
28.2	62.824	57.94	36.501	72.42	8.87	82.79	41.683	31.75
Sept. 7.2	62.665	57.68	36.278	72.31	7.90	82.22	41.426	31.31
17.2	62.507	57.53	36.056	71.76	6.95	81.13	41.172	30.53
27.2	62.359	57.53	35.847	70.80	6.04	79.55	40.935	29.45
Oct. 7.1	62.232	57.68	35.658	69.44	5.19	77.50	40.731	28.11
17.1	62.132	58.01	35.500	67.67	4.44	75.01	40.571	26.56
27.1	62.069	58.51	35.382	65.53	3.79	72.15	40.467	24.84
Nov. 6.1	62.050	59.22	35.311	63.07	3.28	68.96	40.431	23.05
16.0	62.078	60.11	35.292	60.33	2.92	65.52	40.468	21.25
26.0	62.156	61.20	35.329	57.37	2.73	61.91	40.578	19.53
Dec. 6.0	62.284	62.47	35.423	54.26	2.70	58.22	40.764	17.96
15.9	62.458	63.88	35.571	51.10	2.86	54.57	41.020	16.58
25.9	62.674	65.40	35.771	47.98	3.19	51.07	41.337	15.47
35.9	62.925	66.99	36.016	45.00	3.67	47.83	41.708	14.66
Mean Place	59.656	53.21	34.188	66.39	10.417	73.09	37.194	11.27
Sec $\delta$ , Tan $\delta$	1.002	-0.061	1.207	+0.676	4.158	+4.036	1.554	-1.190
$D\psi a$ , $D_{\omega} a$	+0.06	0.00	+0.05	+0.02	-0.03	+0.12	+0.09	-0.09
$D\psi \delta$ , $D_{\omega} \delta$	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Ophiuchi. Mag. 3.3		$\sigma$ Scorpii. Mag. 3.1		$\tau$ Herculis. Mag. 3.9		$\gamma$ Herculis. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 13	° ' " - 4 29	h m 16 16	° ' " -25 23	h m 16 17	° ' " +46 30	h m 16 18	° ' " +19 20
	s	"	s	"	s	"	s	"
Jan. 0.9	55.608	33.79	8.363	42.42	13.826	22.48	15.200	39.24
10.9	55.879 <sup>271</sup>	35.33 <sup>154</sup>	8.665 <sup>302</sup>	42.97 <sup>55</sup>	14.113 <sup>287</sup>	19.41 <sup>307</sup>	15.458 <sup>258</sup>	36.78 <sup>246</sup>
20.8	56.172 <sup>293</sup>	36.84 <sup>151</sup>	8.990 <sup>325</sup>	43.66 <sup>69</sup>	14.440 <sup>327</sup>	16.69 <sup>272</sup>	15.741 <sup>283</sup>	34.51 <sup>227</sup>
30.8	56.480 <sup>308</sup>	38.27 <sup>143</sup>	9.331 <sup>341</sup>	44.44 <sup>78</sup>	14.799 <sup>359</sup>	14.48 <sup>226</sup>	16.043 <sup>302</sup>	32.55 <sup>196</sup>
Feb. 9.8	56.794 <sup>314</sup>	39.55 <sup>128</sup>	9.680 <sup>349</sup>	45.30 <sup>86</sup>	15.177 <sup>378</sup>	12.72 <sup>171</sup>	16.355 <sup>312</sup>	30.95 <sup>160</sup>
	313	108	348	89	386	112	314	118
19.8	57.107	40.63	10.028	46.19	15.563	11.60	16.669	29.77
Mar. 1.7	57.413 <sup>306</sup>	41.49 <sup>86</sup>	10.369 <sup>341</sup>	47.06 <sup>87</sup>	15.947 <sup>384</sup>	11.12 <sup>48</sup>	16.978 <sup>309</sup>	29.05 <sup>72</sup>
11.7	57.709 <sup>296</sup>	42.08 <sup>59</sup>	10.699 <sup>330</sup>	47.91 <sup>85</sup>	16.319 <sup>372</sup>	11.28 <sup>16</sup>	17.276 <sup>298</sup>	28.81 <sup>24</sup>
21.7	57.990 <sup>281</sup>	42.40 <sup>32</sup>	11.013 <sup>314</sup>	48.70 <sup>79</sup>	16.670 <sup>351</sup>	12.07 <sup>79</sup>	17.560 <sup>284</sup>	29.04 <sup>23</sup>
31.7	58.251 <sup>261</sup>	42.47 <sup>7</sup>	11.307 <sup>294</sup>	49.41 <sup>71</sup>	16.994 <sup>324</sup>	13.43 <sup>136</sup>	17.824 <sup>264</sup>	29.73 <sup>69</sup>
	242	19	274	66	289	188	242	109
Apr. 10.6	58.493	42.28	11.581	50.07	17.283	15.31	18.066	30.82
20.6	58.712 <sup>219</sup>	41.90 <sup>38</sup>	11.830 <sup>249</sup>	50.65 <sup>58</sup>	17.532 <sup>249</sup>	17.63 <sup>232</sup>	18.281 <sup>215</sup>	32.25 <sup>143</sup>
30.6	58.907 <sup>195</sup>	41.33 <sup>57</sup>	12.051 <sup>221</sup>	51.16 <sup>51</sup>	17.738 <sup>206</sup>	20.29 <sup>266</sup>	18.470 <sup>189</sup>	33.98 <sup>173</sup>
May 10.5	59.074 <sup>167</sup>	40.60 <sup>73</sup>	12.245 <sup>194</sup>	51.61 <sup>45</sup>	17.899 <sup>161</sup>	23.18 <sup>289</sup>	18.628 <sup>158</sup>	35.91 <sup>193</sup>
20.5	59.214 <sup>140</sup>	39.79 <sup>81</sup>	12.408 <sup>163</sup>	52.01 <sup>40</sup>	18.011 <sup>112</sup>	26.22 <sup>304</sup>	18.754 <sup>126</sup>	37.97 <sup>206</sup>
	109	88	129	35	63	307	94	214
30.5	59.323	38.91	12.537	52.36	18.074	29.29	18.848	40.11
June 9.5	59.400 <sup>77</sup>	38.01 <sup>90</sup>	12.632 <sup>95</sup>	52.66 <sup>30</sup>	18.087 <sup>13</sup>	32.30 <sup>301</sup>	18.907 <sup>59</sup>	42.23 <sup>212</sup>
19.4	59.444 <sup>44</sup>	37.11 <sup>90</sup>	12.689 <sup>57</sup>	52.90 <sup>24</sup>	18.051 <sup>36</sup>	35.18 <sup>288</sup>	18.930 <sup>23</sup>	44.29 <sup>206</sup>
29.4	59.454 <sup>10</sup>	36.24 <sup>87</sup>	12.708 <sup>19</sup>	53.11 <sup>21</sup>	17.968 <sup>83</sup>	37.83 <sup>265</sup>	18.918 <sup>12</sup>	46.22 <sup>193</sup>
July 9.4	59.430 <sup>24</sup>	35.41 <sup>83</sup>	12.689 <sup>19</sup>	53.26 <sup>15</sup>	17.839 <sup>129</sup>	40.20 <sup>237</sup>	18.872 <sup>46</sup>	47.98 <sup>176</sup>
	57	75	57	7	171	202	80	153
19.4	59.373	34.66	12.632	53.33	17.668	42.22	18.792	49.51
29.3	59.287 <sup>86</sup>	33.99 <sup>67</sup>	12.542 <sup>90</sup>	53.33 <sup>0</sup>	17.460 <sup>208</sup>	43.85 <sup>163</sup>	18.681 <sup>111</sup>	50.80 <sup>129</sup>
Aug. 8.3	59.173 <sup>114</sup>	33.39 <sup>60</sup>	12.421 <sup>121</sup>	53.24 <sup>9</sup>	17.221 <sup>239</sup>	45.06 <sup>121</sup>	18.544 <sup>137</sup>	51.83 <sup>103</sup>
18.3	59.038 <sup>135</sup>	32.89 <sup>50</sup>	12.275 <sup>146</sup>	53.03 <sup>21</sup>	16.956 <sup>265</sup>	45.81 <sup>75</sup>	18.384 <sup>160</sup>	52.55 <sup>72</sup>
28.2	58.887 <sup>151</sup>	32.49 <sup>40</sup>	12.110 <sup>165</sup>	52.74 <sup>29</sup>	16.675 <sup>281</sup>	46.10 <sup>29</sup>	18.209 <sup>175</sup>	52.97 <sup>42</sup>
	159	29	173	39	289	20	183	10
Sept. 7.2	58.728	32.20	11.937	52.35	16.386	45.90	18.026	53.07
17.2	58.569 <sup>159</sup>	32.04 <sup>16</sup>	11.764 <sup>173</sup>	51.87 <sup>48</sup>	16.099 <sup>287</sup>	45.22 <sup>68</sup>	17.843 <sup>183</sup>	52.84 <sup>23</sup>
27.2	58.420 <sup>149</sup>	32.00 <sup>4</sup>	11.603 <sup>161</sup>	51.31 <sup>56</sup>	15.825 <sup>274</sup>	44.07 <sup>115</sup>	17.669 <sup>174</sup>	52.27 <sup>57</sup>
Oct. 7.1	58.291 <sup>129</sup>	32.11 <sup>11</sup>	11.462 <sup>141</sup>	50.71 <sup>60</sup>	15.575 <sup>250</sup>	42.46 <sup>161</sup>	17.514 <sup>155</sup>	51.39 <sup>88</sup>
17.1	58.188 <sup>103</sup>	32.38 <sup>27</sup>	11.353 <sup>109</sup>	50.10 <sup>61</sup>	15.360 <sup>215</sup>	40.42 <sup>204</sup>	17.387 <sup>127</sup>	50.18 <sup>121</sup>
	65	44	68	59	171	245	93	153
27.1	58.123	32.82	11.285	49.51	15.189	37.97	17.294	48.65
Nov. 6.1	58.101 <sup>22</sup>	33.46 <sup>64</sup>	11.265 <sup>20</sup>	48.98 <sup>53</sup>	15.071 <sup>118</sup>	35.17 <sup>280</sup>	17.244 <sup>50</sup>	46.83 <sup>182</sup>
16.0	58.127 <sup>26</sup>	34.28 <sup>82</sup>	11.297 <sup>32</sup>	48.55 <sup>43</sup>	15.012 <sup>59</sup>	32.07 <sup>310</sup>	17.243 <sup>1</sup>	44.74 <sup>209</sup>
26.0	58.202 <sup>75</sup>	35.28 <sup>100</sup>	11.385 <sup>88</sup>	48.28 <sup>27</sup>	15.019 <sup>7</sup>	28.76 <sup>331</sup>	17.293 <sup>50</sup>	42.44 <sup>230</sup>
Dec. 6.0	58.327 <sup>125</sup>	36.47 <sup>119</sup>	11.529 <sup>144</sup>	48.16 <sup>12</sup>	15.091 <sup>72</sup>	25.31 <sup>345</sup>	17.393 <sup>100</sup>	39.97 <sup>247</sup>
	171	134	194	6	138	350	150	259
15.9	58.498	37.81	11.723	48.22	15.229	21.81	17.543	37.38
25.9	58.712 <sup>214</sup>	39.26 <sup>145</sup>	11.963 <sup>240</sup>	48.48 <sup>26</sup>	15.427 <sup>198</sup>	18.39 <sup>342</sup>	17.737 <sup>194</sup>	34.79 <sup>259</sup>
35.9	58.962 <sup>250</sup>	40.78 <sup>152</sup>	12.241 <sup>278</sup>	48.91 <sup>43</sup>	15.682 <sup>255</sup>	15.15 <sup>324</sup>	17.970 <sup>233</sup>	32.26 <sup>253</sup>
Mean Place	55.670	27.83	8.421	40.82	14.756	37.45	15.476	49.87
Sec $\delta$ , Tan $\delta$	1.003	-0.079	1.107	-0.475	1.453	+1.054	1.060	+0.351
$D\delta/\alpha$ , $D\omega/\alpha$	+0.06	0.00	+0.07	-0.01	+0.04	+0.03	+0.05	+0.01
$D\delta/\delta$ , $D\omega/\delta$	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	77 Ursæ Minoris. Mag. 5.0		γ Apodis. Mag. 3.9		ω Herculis. Mag. 4.5		77 Draconis. Mag. 2.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 19	° ' " +75 56	h m 16 20	° ' " -78 42	h m 16 21	° ' " +14 13	h m 16 22	° ' " +61 41
	s	"	s	"	s	"	s	"
Jan. 0.9	49.88	32.61	37.53	41.62	34.620	15.25	49.92	50.46
10.9	50.43	29.54	38.62	39.78	34.876	12.96	50.26	47.27
20.9	51.12	26.90	39.84	38.38	35.155	10.86	50.67	44.47
30.8	51.91	24.77	41.16	37.46	35.452	8.98	51.13	42.18
Feb. 9.8	52.79	23.24	42.54	37.04	35.760	7.43	51.62	40.47
19.8	53.71	22.37	43.94	37.10	36.070	6.25	52.13	39.40
Mar. 1.7	54.64	22.17	45.33	37.63	36.374	5.49	52.65	39.02
11.7	55.55	22.66	46.70	38.62	36.670	5.16	53.16	39.31
21.7	56.42	23.78	48.01	40.01	36.951	5.26	53.64	40.27
31.7	57.20	25.50	49.24	41.79	37.213	5.78	54.08	41.84
Apr. 10.6	57.87	27.73	50.37	43.90	37.455	6.69	54.47	43.95
20.6	58.42	30.40	51.38	46.30	37.672	7.92	54.80	46.50
30.6	58.84	33.40	52.25	48.93	37.864	9.41	55.06	49.39
May 10.6	59.10	36.60	52.97	51.73	38.026	11.10	55.25	52.55
20.5	59.21	39.92	53.53	54.64	38.159	12.93	55.36	55.84
30.5	59.17	43.24	53.91	57.61	38.260	14.83	55.40	59.15
June 9.5	58.97	46.45	54.12	60.55	38.326	16.73	55.37	62.40
19.4	58.63	49.47	54.14	63.39	38.359	18.58	55.27	65.48
29.4	58.16	52.23	53.97	66.06	38.358	20.33	55.09	68.32
July 9.4	57.55	54.63	53.63	68.50	38.321	21.92	54.85	70.84
19.4	56.85	56.64	53.12	70.62	38.252	23.33	54.55	72.98
29.3	56.05	58.20	52.47	72.36	38.153	24.52	54.20	74.69
Aug. 8.3	55.18	59.28	51.69	73.67	38.024	25.49	53.80	75.93
18.3	54.26	59.85	50.81	74.49	37.875	26.19	53.36	76.68
28.3	53.30	59.91	49.86	74.79	37.709	26.63	52.91	76.92
Sept. 7.2	52.34	59.44	48.89	74.55	37.534	26.79	52.46	76.65
17.2	51.39	58.46	47.93	73.76	37.359	26.66	52.00	75.85
27.2	50.47	56.99	47.04	72.45	37.193	26.24	51.56	74.54
Oct. 7.1	49.62	55.04	46.24	70.65	37.043	25.53	51.17	72.75
17.1	48.85	52.65	45.58	68.43	36.921	24.53	50.81	70.50
27.1	48.18	49.87	45.09	65.86	36.834	23.23	50.50	67.83
Nov. 6.1	47.66	46.75	44.79	63.04	36.788	21.65	50.27	64.79
16.0	47.28	43.37	44.73	60.07	36.790	19.83	50.12	61.47
26.0	47.06	39.79	44.88	57.07	36.841	17.78	50.05	57.91
Dec. 6.0	47.01	36.13	45.26	54.15	36.942	15.57	50.09	54.24
15.9	47.13	32.49	45.87	51.40	37.091	13.24	50.21	50.55
25.9	47.43	28.98	46.68	48.94	37.285	10.88	50.42	46.97
35.9	47.89	25.71	47.68	46.83	37.517	8.53	50.71	43.59
Mean Place	54.741	49.54	40.624	47.43	34.845	24.78	51.890	66.46
Sec δ, Tan δ	4 118	+3.994	5.110	-5.012	1.032	+0.253	2.109	+1.857
Dψ α, Dω α	-0.03	+0.11	+0.18	-0.14	+0.05	+0.01	+0.02	+0.05
Dψ δ, Dω δ	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Scorpi. (Antares.) Mag. 1.2		$\beta$ Herculis. Mag. 2.8		$\lambda$ Ophiuchi. Mag. 3.8		$\delta$ Draconis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 24	" ' -26 14	h m 16 26	" ' +21 39	h m 16 26	" ' + 2 9	h m 16 28	" ' +68 56
	s	"	s	"	s	"	s	"
Jan. 0.9	18.837	57.29	38.687	59.85	43.416	45.88	5.29	35.89
10.9	19.135 <sup>298</sup>	57.73	38.938 <sup>251</sup>	57.31 <sup>254</sup>	43.672 <sup>256</sup>	44.08 <sup>180</sup>	5.69 <sup>40</sup>	32.69 <sup>320</sup>
20.9	19.458 <sup>323</sup>	58.32	39.216 <sup>278</sup>	54.97 <sup>234</sup>	43.952 <sup>280</sup>	42.36 <sup>172</sup>	6.17 <sup>48</sup>	29.89 <sup>280</sup>
30.8	19.797 <sup>339</sup>	59.02	39.516 <sup>300</sup>	52.94 <sup>203</sup>	44.248 <sup>296</sup>	40.79 <sup>157</sup>	6.73 <sup>56</sup>	27.60 <sup>229</sup>
Feb. 9.8	20.145 <sup>348</sup>	59.79	39.826 <sup>310</sup>	51.29 <sup>165</sup>	44.554 <sup>306</sup>	39.42 <sup>137</sup>	7.34 <sup>61</sup>	25.89 <sup>171</sup>
	350	81	315	121	308	110	65	107
19.8	20.495	60.60	40.141	50.08	44.862	38.32	7.99	24.82
Mar. 1.7	20.840 <sup>345</sup>	61.41	40.453 <sup>312</sup>	49.34 <sup>74</sup>	45.165 <sup>303</sup>	37.51 <sup>81</sup>	8.65 <sup>66</sup>	24.45 <sup>37</sup>
11.7	21.174 <sup>334</sup>	62.19	40.756 <sup>303</sup>	49.10 <sup>24</sup>	45.460 <sup>295</sup>	37.02 <sup>49</sup>	9.29 <sup>64</sup>	24.75 <sup>30</sup>
21.7	21.494 <sup>320</sup>	62.93	41.045 <sup>289</sup>	49.35 <sup>25</sup>	45.742 <sup>282</sup>	36.87 <sup>15</sup>	9.91 <sup>62</sup>	25.73 <sup>98</sup>
31.7	21.795 <sup>301</sup>	63.61	41.316 <sup>271</sup>	50.07 <sup>72</sup>	46.006 <sup>264</sup>	37.03 <sup>16</sup>	10.47 <sup>56</sup>	27.31 <sup>158</sup>
	282	62	248	115	246	45	50	212
Apr. 10.6	22.077	64.23	41.564	51.22	46.252	37.48	10.97	29.43
20.6	22.334 <sup>257</sup>	64.79	41.787 <sup>223</sup>	52.74 <sup>152</sup>	46.476 <sup>224</sup>	38.21 <sup>73</sup>	11.38 <sup>41</sup>	32.01 <sup>253</sup>
30.6	22.567 <sup>233</sup>	65.30	41.983 <sup>196</sup>	54.55 <sup>181</sup>	46.675 <sup>199</sup>	39.14 <sup>93</sup>	11.70 <sup>32</sup>	34.95 <sup>294</sup>
May 10.6	22.770 <sup>203</sup>	65.76	42.148 <sup>165</sup>	56.60 <sup>205</sup>	46.848 <sup>173</sup>	40.24 <sup>110</sup>	11.94 <sup>24</sup>	38.13 <sup>313</sup>
20.5	22.943 <sup>173</sup>	66.17	42.282 <sup>134</sup>	58.78 <sup>218</sup>	46.994 <sup>146</sup>	41.47 <sup>123</sup>	12.07 <sup>13</sup>	41.45 <sup>332</sup>
	140	37	100	225	115	128	3	336
30.5	23.083	66.54	42.382	61.03	47.109	42.75	12.10	44.81
June 9.5	23.186 <sup>103</sup>	66.88	42.446 <sup>64</sup>	63.29 <sup>226</sup>	47.192 <sup>83</sup>	44.06 <sup>131</sup>	12.03 <sup>7</sup>	48.10 <sup>329</sup>
19.4	23.251 <sup>65</sup>	67.17	42.474 <sup>28</sup>	65.47 <sup>218</sup>	47.242 <sup>50</sup>	45.35 <sup>120</sup>	11.85 <sup>18</sup>	51.21 <sup>311</sup>
29.4	23.277 <sup>26</sup>	67.41	42.465 <sup>9</sup>	67.52 <sup>205</sup>	47.257 <sup>15</sup>	46.58 <sup>123</sup>	11.59 <sup>26</sup>	54.09 <sup>288</sup>
July 9.4	23.264 <sup>13</sup>	67.61	42.421 <sup>44</sup>	69.40 <sup>188</sup>	47.238 <sup>19</sup>	47.72 <sup>114</sup>	11.24 <sup>35</sup>	56.64 <sup>255</sup>
	50	13	79	165	53	103	43	217
19.4	23.214	67.74	42.342	71.05	47.185	48.75	10.81	58.81
29.3	23.126 <sup>88</sup>	67.78	42.230 <sup>112</sup>	72.45 <sup>140</sup>	47.100 <sup>85</sup>	49.65 <sup>90</sup>	10.32 <sup>49</sup>	60.55 <sup>174</sup>
Aug. 8.3	23.007 <sup>119</sup>	67.74	42.091 <sup>139</sup>	73.56 <sup>111</sup>	46.988 <sup>112</sup>	50.39 <sup>74</sup>	9.77 <sup>55</sup>	61.81 <sup>126</sup>
18.3	22.862 <sup>145</sup>	67.60	41.928 <sup>163</sup>	74.35 <sup>79</sup>	46.853 <sup>135</sup>	50.99 <sup>60</sup>	9.18 <sup>59</sup>	62.58 <sup>77</sup>
28.3	22.696 <sup>166</sup>	67.34	41.748 <sup>180</sup>	74.83 <sup>48</sup>	46.700 <sup>153</sup>	51.43 <sup>44</sup>	8.56 <sup>62</sup>	62.84 <sup>26</sup>
	175	36	189	13	164	25	63	27
Sept. 7.2	22.521	66.98	41.559	74.96	46.536	51.68	7.93	62.57
17.2	22.344 <sup>177</sup>	66.52	41.368 <sup>191</sup>	74.74 <sup>22</sup>	46.373 <sup>163</sup>	51.76 <sup>8</sup>	7.30 <sup>63</sup>	61.78 <sup>79</sup>
27.2	22.178 <sup>166</sup>	65.98	41.185 <sup>183</sup>	74.18 <sup>56</sup>	46.216 <sup>157</sup>	51.65 <sup>11</sup>	6.69 <sup>61</sup>	60.47 <sup>131</sup>
Oct. 7.1	22.031 <sup>147</sup>	65.39	41.021 <sup>164</sup>	73.28 <sup>90</sup>	46.075 <sup>141</sup>	51.33 <sup>32</sup>	6.12 <sup>57</sup>	58.68 <sup>179</sup>
17.1	21.916 <sup>115</sup>	64.76	40.882 <sup>139</sup>	72.03 <sup>125</sup>	45.962 <sup>113</sup>	50.80 <sup>53</sup>	5.61 <sup>51</sup>	56.42 <sup>226</sup>
	75	62	103	158	79	75	43	268
27.1	21.841	64.14	40.779	70.45	45.883	50.05	5.18	53.74
Nov. 6.1	21.813 <sup>28</sup>	63.57	40.718 <sup>61</sup>	68.58 <sup>187</sup>	45.845 <sup>38</sup>	49.10 <sup>95</sup>	4.83 <sup>35</sup>	50.70 <sup>304</sup>
16.0	21.837 <sup>24</sup>	63.09	40.705 <sup>13</sup>	66.42 <sup>216</sup>	45.853 <sup>8</sup>	47.93 <sup>117</sup>	4.58 <sup>25</sup>	47.37 <sup>333</sup>
26.0	21.917 <sup>80</sup>	62.74	40.743 <sup>38</sup>	64.04 <sup>238</sup>	45.910 <sup>57</sup>	46.56 <sup>137</sup>	4.45 <sup>13</sup>	43.81 <sup>356</sup>
Dec. 6.0	22.052 <sup>135</sup>	62.55	40.833 <sup>90</sup>	61.47 <sup>257</sup>	46.016 <sup>106</sup>	45.03 <sup>153</sup>	4.43 <sup>2</sup>	40.13 <sup>368</sup>
	187	3	139	266	154	169	10	370
16.0	22.239	62.52	40.972	58.81	46.170	43.34	4.53	36.43
25.9	22.473 <sup>234</sup>	62.69	41.157 <sup>185</sup>	56.12 <sup>269</sup>	46.367 <sup>197</sup>	41.57 <sup>177</sup>	4.75 <sup>22</sup>	32.84 <sup>359</sup>
35.9	22.746 <sup>273</sup>	63.02	41.383 <sup>226</sup>	53.50 <sup>262</sup>	46.599 <sup>232</sup>	39.77 <sup>180</sup>	5.09 <sup>34</sup>	29.46 <sup>338</sup>
Mean Place	18.923	55.76	39.031	70.50	43.554	52.94	8.325	51.84
Sec $\delta$ , Tan $\delta$	1.115	-0.493	1.076	+0.397	1.001	+0.038	2.783	+2.598
$D\psi \alpha$ , $D\omega \alpha$	+0.07	-0.01	+0.05	+0.01	+0.06	0.00	0.00	+0.07
$D\psi \delta$ , $D\omega \delta$	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9	-0.2	-0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\tau$ Scorpii. Mag. 2.9		$\sigma$ Herculis. Mag. 4.2		$\zeta$ Ophiuchi. Mag. 2.7		$\delta$ Scorpii. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 30	° ' " -28 2	h m 16 31	° ' " +42 36	h m 16 32	° ' " -10 23	h m 16 36	° ' " -17 34
	s	"	s	"	s	"	s	"
Jan. 0.9	42.631	42.91	24.749	13.35	35.093	64.21	46.116	60.01
10.9	42.929 <sup>298</sup>	43.22	25.012 <sup>263</sup>	10.27 <sup>308</sup>	35.357 <sup>264</sup>	65.41 <sup>120</sup>	46.386 <sup>270</sup>	60.82 <sup>81</sup>
20.9	43.252 <sup>323</sup>	43.68	25.315 <sup>303</sup>	7.52 <sup>275</sup>	35.645 <sup>288</sup>	66.62 <sup>121</sup>	46.683 <sup>297</sup>	61.69 <sup>87</sup>
30.8	43.593 <sup>341</sup>	44.25	25.648 <sup>333</sup>	5.19 <sup>233</sup>	35.951 <sup>306</sup>	67.79 <sup>117</sup>	46.997 <sup>314</sup>	62.60 <sup>91</sup>
Feb. 9.8	43.946 <sup>353</sup>	44.92	26.003 <sup>355</sup>	3.36 <sup>183</sup>	36.266 <sup>315</sup>	68.88 <sup>109</sup>	47.322 <sup>325</sup>	63.49 <sup>89</sup>
19.8	44.300 <sup>354</sup>	45.66	26.367 <sup>364</sup>	2.10 <sup>126</sup>	36.583 <sup>317</sup>	69.84 <sup>96</sup>	47.649 <sup>327</sup>	64.32 <sup>83</sup>
Mar. 1.7	44.649 <sup>349</sup>	46.41	26.732 <sup>365</sup>	1.46 <sup>64</sup>	36.896 <sup>313</sup>	70.62 <sup>78</sup>	47.974 <sup>325</sup>	65.06 <sup>74</sup>
11.7	44.990 <sup>341</sup>	47.15	27.088 <sup>356</sup>	1.45 <sup>1</sup>	37.201 <sup>305</sup>	71.22 <sup>60</sup>	48.291 <sup>317</sup>	65.69 <sup>63</sup>
21.7	45.318 <sup>328</sup>	47.86	27.429 <sup>341</sup>	2.05 <sup>60</sup>	37.494 <sup>293</sup>	71.61 <sup>39</sup>	48.595 <sup>304</sup>	66.19 <sup>50</sup>
31.7	45.627 <sup>309</sup>	48.54	27.746 <sup>317</sup>	3.24 <sup>119</sup>	37.771 <sup>277</sup>	71.79 <sup>18</sup>	48.885 <sup>290</sup>	66.56 <sup>37</sup>
Apr. 10.6	45.917 <sup>290</sup>	49.19	28.035 <sup>289</sup>	4.94 <sup>170</sup>	38.030 <sup>259</sup>	71.77 <sup>2</sup>	49.157 <sup>272</sup>	66.77 <sup>21</sup>
20.6	46.184 <sup>267</sup>	49.79	28.289 <sup>254</sup>	7.09 <sup>215</sup>	38.269 <sup>239</sup>	71.57 <sup>20</sup>	49.407 <sup>250</sup>	66.88 <sup>11</sup>
30.6	46.426 <sup>242</sup>	50.34	28.506 <sup>217</sup>	9.61 <sup>252</sup>	38.484 <sup>215</sup>	71.24 <sup>33</sup>	49.635 <sup>228</sup>	66.89 <sup>1</sup>
May 10.6	46.638 <sup>212</sup>	50.86	28.681 <sup>175</sup>	12.38 <sup>277</sup>	38.674 <sup>190</sup>	70.79 <sup>45</sup>	49.836 <sup>201</sup>	66.81 <sup>8</sup>
20.5	46.820 <sup>182</sup>	51.34	28.812 <sup>131</sup>	15.32 <sup>294</sup>	38.835 <sup>161</sup>	70.25 <sup>54</sup>	50.009 <sup>173</sup>	66.66 <sup>15</sup>
30.5	46.968 <sup>148</sup>	51.80	28.898 <sup>86</sup>	18.32 <sup>300</sup>	38.967 <sup>132</sup>	69.65 <sup>60</sup>	50.152 <sup>143</sup>	66.47 <sup>19</sup>
June 9.5	47.079 <sup>111</sup>	52.23	28.937 <sup>39</sup>	21.31 <sup>299</sup>	39.066 <sup>99</sup>	69.03 <sup>62</sup>	50.260 <sup>108</sup>	66.26 <sup>21</sup>
19.4	47.152 <sup>73</sup>	52.62	28.930 <sup>7</sup>	24.19 <sup>288</sup>	39.130 <sup>64</sup>	68.41 <sup>62</sup>	50.333 <sup>73</sup>	66.03 <sup>23</sup>
29.4	47.184 <sup>32</sup>	52.96	28.877 <sup>53</sup>	26.87 <sup>268</sup>	39.158 <sup>28</sup>	67.80 <sup>61</sup>	50.368 <sup>35</sup>	65.79 <sup>24</sup>
July 9.4	47.176 <sup>8</sup>	53.25	28.779 <sup>98</sup>	29.30 <sup>243</sup>	39.150 <sup>8</sup>	67.21 <sup>59</sup>	50.366 <sup>2</sup>	65.55 <sup>24</sup>
19.4	47.130 <sup>46</sup>	53.46	28.640 <sup>139</sup>	31.42 <sup>212</sup>	39.108 <sup>42</sup>	66.66 <sup>55</sup>	50.327 <sup>39</sup>	65.31 <sup>24</sup>
29.3	47.045 <sup>85</sup>	53.59	28.462 <sup>178</sup>	33.18 <sup>176</sup>	39.032 <sup>76</sup>	66.16 <sup>50</sup>	50.253 <sup>74</sup>	65.07 <sup>24</sup>
Aug. 8.3	46.926 <sup>119</sup>	53.62	28.250 <sup>212</sup>	34.53 <sup>135</sup>	38.925 <sup>107</sup>	65.70 <sup>46</sup>	50.147 <sup>106</sup>	64.81 <sup>26</sup>
18.3	46.780 <sup>146</sup>	53.54	28.013 <sup>237</sup>	35.46 <sup>93</sup>	38.794 <sup>131</sup>	65.28 <sup>42</sup>	50.015 <sup>132</sup>	64.54 <sup>27</sup>
28.3	46.613 <sup>167</sup>	53.33	27.756 <sup>257</sup>	35.94 <sup>48</sup>	38.645 <sup>149</sup>	64.92 <sup>36</sup>	49.862 <sup>153</sup>	64.25 <sup>29</sup>
Sept. 7.2	46.435 <sup>178</sup>	53.01	27.490 <sup>266</sup>	35.95 <sup>1</sup>	38.484 <sup>161</sup>	64.61 <sup>31</sup>	49.695 <sup>167</sup>	63.95 <sup>30</sup>
17.2	46.254 <sup>181</sup>	52.57	27.222 <sup>268</sup>	35.50 <sup>45</sup>	38.319 <sup>165</sup>	64.37 <sup>24</sup>	49.527 <sup>168</sup>	63.63 <sup>32</sup>
27.2	46.082 <sup>172</sup>	52.03	26.964 <sup>258</sup>	34.58 <sup>92</sup>	38.162 <sup>157</sup>	64.19 <sup>18</sup>	49.365 <sup>162</sup>	63.32 <sup>31</sup>
Oct. 7.1	45.929 <sup>153</sup>	51.41	26.725 <sup>239</sup>	33.20 <sup>138</sup>	38.022 <sup>140</sup>	64.10 <sup>9</sup>	49.220 <sup>145</sup>	63.02 <sup>30</sup>
17.1	45.807 <sup>122</sup>	50.73	26.517 <sup>208</sup>	31.38 <sup>182</sup>	37.909 <sup>113</sup>	64.12 <sup>2</sup>	49.102 <sup>118</sup>	62.77 <sup>25</sup>
27.1	45.724 <sup>83</sup>	50.04	26.349 <sup>168</sup>	29.16 <sup>222</sup>	37.831 <sup>78</sup>	64.25 <sup>13</sup>	49.020 <sup>82</sup>	62.58 <sup>19</sup>
Nov. 6.1	45.689 <sup>35</sup>	49.39	26.230 <sup>119</sup>	26.57 <sup>259</sup>	37.795 <sup>36</sup>	64.54 <sup>29</sup>	48.981 <sup>39</sup>	62.48 <sup>10</sup>
16.0	45.706 <sup>17</sup>	48.80	26.166 <sup>64</sup>	23.67 <sup>290</sup>	37.806 <sup>11</sup>	64.98 <sup>44</sup>	48.990 <sup>9</sup>	62.49 <sup>1</sup>
26.0	45.780 <sup>74</sup>	48.32	26.163 <sup>3</sup>	20.52 <sup>315</sup>	37.867 <sup>61</sup>	65.58 <sup>60</sup>	49.052 <sup>62</sup>	62.64 <sup>15</sup>
Dec. 6.0	45.910 <sup>130</sup>	47.99	26.221 <sup>58</sup>	17.21 <sup>331</sup>	37.978 <sup>111</sup>	66.36 <sup>78</sup>	49.165 <sup>113</sup>	62.96 <sup>32</sup>
16.0	46.093 <sup>183</sup>	47.83	26.341 <sup>120</sup>	13.82 <sup>339</sup>	38.138 <sup>160</sup>	67.28 <sup>92</sup>	49.328 <sup>163</sup>	63.42 <sup>46</sup>
25.9	46.324 <sup>231</sup>	47.85	26.520 <sup>179</sup>	10.47 <sup>335</sup>	38.342 <sup>204</sup>	68.33 <sup>105</sup>	49.536 <sup>208</sup>	64.03 <sup>61</sup>
35.9	46.596 <sup>272</sup>	48.05	26.751 <sup>231</sup>	7.25 <sup>322</sup>	38.581 <sup>239</sup>	69.46 <sup>113</sup>	49.785 <sup>249</sup>	64.76 <sup>73</sup>
Mean Place	42.742	41.64	25.615	26.80	35.194	59.67	46.219	56.80
Sec $\delta$ , Tan $\delta$	1.133	-0.533	1.359	+0.920	1.017	-0.184	1.049	-0.317
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.07	-0.01	+0.04	+0.02	+0.07	0.00	+0.07	-0.01
$D_{\psi} \delta$ , $D_{\omega} \delta$	-0.2	-0.9	-0.2	-0.9	-0.1	-0.9	-0.1	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Herculis. Mag. 3.0		α Triang. Aust. Mag. 1.9		η Herculis. Mag. 3.6		Groombridge 2377. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 38	° ' " +31 44	h m 16 39	° ' " -68 52	h m 16 40	° ' " +39 4	h m 16 43	° ' " +56 55
	s	"	s	"	s	"	s	"
Jan. 0.9	8.835	57.32	50.40	33.37	2.192	33.37	41.630	33.68
10.9	9.078 <sup>243</sup>	54.47 <sup>285</sup>	51.01 <sup>61</sup>	31.66 <sup>171</sup>	2.441 <sup>249</sup>	30.33 <sup>304</sup>	41.914 <sup>284</sup>	30.39 <sup>329</sup>
20.9	9.355 <sup>277</sup>	51.89 <sup>258</sup>	51.69 <sup>68</sup>	30.33 <sup>133</sup>	2.728 <sup>287</sup>	27.59 <sup>274</sup>	42.258 <sup>344</sup>	27.45 <sup>294</sup>
30.8	9.659 <sup>304</sup>	49.66 <sup>223</sup>	52.42 <sup>73</sup>	29.38 <sup>95</sup>	3.046 <sup>318</sup>	25.24 <sup>235</sup>	42.650 <sup>392</sup>	24.97 <sup>248</sup>
Feb. 9.8	9.978 <sup>319</sup>	47.86 <sup>180</sup>	53.19 <sup>77</sup>	28.87 <sup>51</sup>	3.384 <sup>338</sup>	23.36 <sup>188</sup>	43.077 <sup>427</sup>	23.03 <sup>194</sup>
	328	129	79	9	348	183	451	132
19.8	10.306	46.57	53.98	28.78	3.732	22.03	43.528	21.71
Mar. 1.8	10.635 <sup>329</sup>	45.83 <sup>74</sup>	54.77 <sup>79</sup>	29.09 <sup>31</sup>	4.083 <sup>351</sup>	21.29 <sup>74</sup>	43.986 <sup>458</sup>	21.04 <sup>67</sup>
11.7	10.957 <sup>322</sup>	45.65 <sup>18</sup>	55.55 <sup>78</sup>	29.79 <sup>70</sup>	4.428 <sup>345</sup>	21.16 <sup>13</sup>	44.440 <sup>454</sup>	21.05 <sup>1</sup>
21.7	11.265 <sup>308</sup>	46.04 <sup>39</sup>	56.31 <sup>76</sup>	30.86 <sup>107</sup>	4.759 <sup>331</sup>	21.65 <sup>49</sup>	44.877 <sup>437</sup>	21.72 <sup>67</sup>
31.7	11.556 <sup>291</sup>	46.96 <sup>92</sup>	57.03 <sup>72</sup>	32.24 <sup>138</sup>	5.069 <sup>310</sup>	22.70 <sup>105</sup>	45.285 <sup>408</sup>	23.02 <sup>130</sup>
	267	141	67	199	286	157	371	188
Apr. 10.6	11.823	48.37	57.70	33.93	5.355	24.27	45.656	24.90
20.6	12.064 <sup>241</sup>	50.21 <sup>184</sup>	58.31 <sup>61</sup>	35.87 <sup>194</sup>	5.610 <sup>255</sup>	26.29 <sup>202</sup>	45.982 <sup>326</sup>	27.25 <sup>235</sup>
30.6	12.273 <sup>209</sup>	52.39 <sup>218</sup>	58.85 <sup>54</sup>	38.04 <sup>217</sup>	5.830 <sup>220</sup>	28.67 <sup>238</sup>	46.254 <sup>272</sup>	29.99 <sup>274</sup>
May 10.6	12.448 <sup>175</sup>	54.83 <sup>244</sup>	59.33 <sup>48</sup>	40.37 <sup>283</sup>	6.012 <sup>182</sup>	31.34 <sup>267</sup>	46.469 <sup>215</sup>	33.03 <sup>304</sup>
20.5	12.690 <sup>142</sup>	57.45 <sup>262</sup>	59.72 <sup>39</sup>	42.83 <sup>246</sup>	6.155 <sup>143</sup>	34.17 <sup>283</sup>	46.621 <sup>152</sup>	36.25 <sup>322</sup>
	102	269	30	252	100	293	87	331
30.5	12.692	60.14	60.02	45.35	6.255	37.10	46.708	39.56
June 9.5	12.754 <sup>62</sup>	62.84 <sup>270</sup>	60.23 <sup>21</sup>	47.89 <sup>254</sup>	6.311 <sup>56</sup>	40.02 <sup>292</sup>	46.730 <sup>22</sup>	42.85 <sup>329</sup>
19.5	12.777 <sup>23</sup>	65.45 <sup>261</sup>	60.32 <sup>9</sup>	50.37 <sup>248</sup>	6.323 <sup>12</sup>	42.85 <sup>283</sup>	46.687 <sup>43</sup>	46.03 <sup>318</sup>
29.4	12.759 <sup>18</sup>	67.93 <sup>248</sup>	60.32 <sup>0</sup>	52.74 <sup>237</sup>	6.289 <sup>34</sup>	45.51 <sup>266</sup>	46.581 <sup>106</sup>	49.01 <sup>298</sup>
July 9.4	12.700 <sup>59</sup>	70.19 <sup>226</sup>	60.22 <sup>10</sup>	54.93 <sup>219</sup>	6.212 <sup>77</sup>	47.95 <sup>244</sup>	46.415 <sup>166</sup>	51.72 <sup>271</sup>
	95	199	19	195	118	213	223	236
19.4	12.605	72.18	60.03	56.88	6.094	50.08	46.192	54.08
29.3	12.473 <sup>132</sup>	73.86 <sup>168</sup>	59.75 <sup>28</sup>	58.51 <sup>163</sup>	5.938 <sup>156</sup>	51.88 <sup>180</sup>	45.918 <sup>274</sup>	56.05 <sup>197</sup>
Aug. 8.3	12.310 <sup>163</sup>	75.20 <sup>134</sup>	59.39 <sup>36</sup>	59.77 <sup>126</sup>	5.749 <sup>189</sup>	53.30 <sup>142</sup>	45.601 <sup>317</sup>	57.59 <sup>154</sup>
18.3	12.122 <sup>188</sup>	76.17 <sup>97</sup>	58.95 <sup>44</sup>	60.63 <sup>86</sup>	5.532 <sup>217</sup>	54.31 <sup>101</sup>	45.249 <sup>352</sup>	58.65 <sup>106</sup>
28.3	11.914 <sup>208</sup>	76.75 <sup>58</sup>	58.48 <sup>47</sup>	61.08 <sup>40</sup>	5.295 <sup>287</sup>	54.89 <sup>58</sup>	44.872 <sup>377</sup>	59.22 <sup>57</sup>
	219	17	50	7	248	13	392	7
Sept. 7.2	11.695	76.92	57.98	60.96	5.047	55.02	44.480	59.29
17.2	11.473 <sup>222</sup>	76.67 <sup>25</sup>	57.48 <sup>50</sup>	60.41 <sup>55</sup>	4.795 <sup>252</sup>	54.70 <sup>82</sup>	44.085 <sup>395</sup>	58.84 <sup>45</sup>
27.2	11.259 <sup>214</sup>	76.01 <sup>66</sup>	56.99 <sup>49</sup>	59.38 <sup>108</sup>	4.550 <sup>245</sup>	53.92 <sup>78</sup>	43.700 <sup>385</sup>	57.87 <sup>97</sup>
Oct. 7.2	11.060 <sup>199</sup>	74.94 <sup>107</sup>	56.56 <sup>43</sup>	57.92 <sup>146</sup>	4.323 <sup>227</sup>	52.70 <sup>122</sup>	43.339 <sup>361</sup>	56.41 <sup>146</sup>
17.1	10.888 <sup>172</sup>	73.47 <sup>147</sup>	56.19 <sup>37</sup>	56.05 <sup>187</sup>	4.124 <sup>199</sup>	51.05 <sup>165</sup>	43.013 <sup>326</sup>	54.47 <sup>194</sup>
	136	183	28	220	162	206	278	237
27.1	10.752	71.64	55.91	53.85	3.962	48.99	42.735	52.10
Nov. 6.1	10.657 <sup>95</sup>	69.45 <sup>219</sup>	55.74 <sup>17</sup>	51.42 <sup>243</sup>	3.847 <sup>115</sup>	46.57 <sup>242</sup>	42.516 <sup>219</sup>	49.32 <sup>278</sup>
16.0	10.614 <sup>43</sup>	66.96 <sup>249</sup>	55.68 <sup>6</sup>	48.82 <sup>260</sup>	3.784 <sup>63</sup>	43.83 <sup>274</sup>	42.367 <sup>149</sup>	46.20 <sup>312</sup>
26.0	10.624 <sup>10</sup>	64.21 <sup>275</sup>	55.76 <sup>8</sup>	46.17 <sup>265</sup>	3.777 <sup>7</sup>	40.82 <sup>301</sup>	42.293 <sup>74</sup>	42.82 <sup>338</sup>
Dec. 6.0	10.688 <sup>64</sup>	61.29 <sup>292</sup>	55.96 <sup>20</sup>	43.57 <sup>260</sup>	3.831 <sup>54</sup>	37.64 <sup>318</sup>	42.299 <sup>6</sup>	39.26 <sup>356</sup>
	119	303	33	246	112	328	87	363
16.0	10.807	58.26	56.29	41.11	3.943	34.36	42.386	35.63
25.9	10.977 <sup>170</sup>	55.22 <sup>304</sup>	56.73 <sup>44</sup>	38.88 <sup>223</sup>	4.111 <sup>168</sup>	31.09 <sup>327</sup>	42.552 <sup>166</sup>	32.05 <sup>358</sup>
35.9	11.193 <sup>216</sup>	52.28 <sup>294</sup>	57.28 <sup>55</sup>	36.93 <sup>195</sup>	4.329 <sup>218</sup>	27.93 <sup>316</sup>	42.791 <sup>239</sup>	28.62 <sup>343</sup>
Mean Place	9.418	68.88	51.756	37.47	2.984	45.77	43.346	47.51
Sec δ, Tan δ	1.176	+0.619	2.775	-2.589	1.288	+0.812	1.833	+1.536
Dψ a, Dω a	+0.05	+0.01	+0.13	-0.06	+0.04	+0.02	+0.02	+0.03
Dψ δ, Dω δ	-0.1	-0.9	-0.1	-0.9	-0.1	-0.9	-0.1	-0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Scorpii. Mag. 2.4		49 Herculis. Mag. 6.4		ε <sup>1</sup> Arse. Mag. 4.2		κ Ophiuchi. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 16 44	° ' " -34 8	h m 16 48	° ' " +15 6	h m 16 52	° ' " -53 1	h m 16 53	° ' " + 9 29
	s	"	s	"	s	"	s	"
Jan. 0.9	46.842 300	38.20 11	17.752 232	36.52 231	57.231 380	62.11 115	44.031 230	63.90 206
10.9	47.142 331	38.09 7	17.984 268	34.21 215	57.611 425	60.96 88	44.261 259	61.84 195
20.9	47.473 354	38.16 24	18.247 283	32.06 192	58.036 460	60.08 57	44.520 279	59.89 175
30.8	47.827 366	38.40 37	18.530 298	30.14 160	58.496 482	59.51 27	44.799 294	58.14 150
Feb. 9.8	48.193 371	38.77 40	18.828 305	28.54 128	58.978 494	59.24 0	45.093 301	56.64 117
19.8	48.564 371	39.26 58	19.133 304	27.31 82	59.472 496	59.24 28	45.394 301	55.47 81
Mar. 1.8	48.935 364	39.84 64	19.437 301	26.49 37	59.968 490	59.52 53	45.695 298	54.66 42
11.7	49.299 351	40.48 69	19.738 290	26.12 7	60.458 477	60.06 78	45.993 289	54.24 2
21.7	49.650 336	41.17 71	20.028 276	26.19 50	60.935 458	60.83 98	46.282 276	54.22 37
31.7	49.986 317	41.88 74	20.304 258	26.69 90	61.393 432	61.81 117	46.558 259	54.59 73
Apr. 10.7	50.303 294	42.62 74	20.562 238	27.59 126	61.825 402	62.98 133	46.817 240	55.32 106
20.6	50.597 268	43.36 76	20.800 213	28.85 155	62.227 366	64.31 149	47.057 218	56.38 131
30.6	50.865 240	44.12 76	21.013 187	30.40 176	62.593 327	65.80 160	47.275 193	57.69 151
May 10.6	51.105 207	44.88 78	21.200 158	32.16 192	62.920 279	67.40 168	47.468 164	59.20 168
20.5	51.312 170	45.64 77	21.358 125	34.08 201	63.199 228	69.08 174	47.632 135	60.88 175
30.5	51.482 131	46.41 75	21.483 92	36.09 204	63.427 174	70.82 176	47.767 101	62.63 177
June 9.5	51.613 90	47.16 72	21.575 56	38.13 199	63.601 116	72.58 173	47.868 66	64.40 175
19.5	51.703 46	47.88 67	21.631 19	40.12 190	63.717 54	74.31 166	47.934 29	66.15 166
29.4	51.749 1	48.55 62	21.650 18	42.02 177	63.771 8	75.97 157	47.963 7	67.81 166
July 9.4	51.750 42	49.17 54	21.632 53	43.79 157	63.763 68	77.54 140	47.956 42	69.37 140
19.4	51.708 85	49.71 43	21.579 87	45.36 137	63.695 126	78.94 117	47.914 78	70.77 122
29.4	51.623 122	50.14 28	21.492 119	46.73 112	63.569 178	80.11 94	47.836 109	71.99 102
Aug. 8.3	51.501 154	50.42 12	21.373 144	47.85 87	63.391 223	81.05 63	47.727 135	73.01 81
18.3	51.347 179	50.54 4	21.229 166	48.72 58	63.168 257	81.68 31	47.592 158	73.82 57
28.3	51.168 194	50.50 22	21.063 178	49.30 30	62.911 278	81.99 3	47.434 171	74.39 32
Sept. 7.2	50.974 198	50.28 40	20.885 182	49.60 1	62.633 285	81.96 40	47.263 176	74.71 9
17.2	50.776 192	49.88 57	20.703 178	49.61 31	62.348 278	81.56 75	47.087 172	74.80 18
27.2	50.584 173	49.31 72	20.525 164	49.30 60	62.070 255	80.81 108	46.915 159	74.62 43
Oct. 7.2	50.411 144	48.59 83	20.361 142	48.70 90	61.815 216	79.73 136	46.756 138	74.19 70
17.1	50.267 103	47.76 91	20.219 108	47.80 121	61.599 163	78.37 161	46.618 106	73.49 96
27.1	50.164 54	46.85 94	20.111 69	46.59 148	61.436 98	76.76 178	46.512 68	72.53 122
Nov. 6.1	50.110 2	45.91 92	20.042 25	45.11 176	61.338 27	74.98 189	46.444 23	71.31 146
16.1	50.112 60	44.99 85	20.017 24	43.35 198	61.311 52	73.09 192	46.421 24	69.85 168
26.0	50.172 119	44.14 73	20.041 74	41.37 218	61.363 132	71.17 186	46.445 73	68.17 186
Dec. 6.0	50.291 175	43.41 60	20.115 123	39.19 230	61.495 208	69.31 174	46.518 121	66.31 200
16.0	50.466 228	42.81 42	20.238 167	36.89 236	61.703 281	67.57 156	46.639 166	64.31 207
25.9	50.694 273	42.39 24	20.405 209	34.53 235	61.984 343	66.01 134	46.805 206	62.24 207
35.9	50.967	42.15	20.614	32.18	62.327	64.67	47.011	60.15 209
Mean Place	47.028	37.71	18.083	45.09	57.748	63.96	44.315	71.40
Sec δ, Tan δ	1.208	-0.678	1.036	+0.270	1.663	-1.329	1.014	+0.168
Dψ α, Dω α	+0.08	-0.01	+0.05	+0.01	+0.09	-0.03	+0.06	0.00
Dψ δ, Dω δ	-0.1	-0.9	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 Ophiuchi. Mag. 5.0			ε Herculis. Mag. 3.9			δ Herculis. Mag. 5.3			η Ophiuchi. Mag. 2.6		
	Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.	
	h m 16 56	° ' " - 4 5		h m 16 57	° ' " +31 2		h m 16 58	° ' " +33 40		h m 17 5	° ' " -15 37	
	s 16 56	"		s 16 57	"		s 16 58	"		s 17 5	"	
Jan. 0.9	40.810	61.88		6.161	42.05		31.699	65.03		36.776	26.73	
10.9	41.047	63.29	141	6.387	39.19	286	31.925	62.09	284	37.020	27.49	76
20.9	41.313	64.67	138	6.649	36.56	263	32.188	59.40	269	37.293	28.29	80
30.8	41.598	65.97	130	6.938	34.24	232	32.481	57.03	237	37.588	29.09	80
Feb. 9.8	41.896	67.11	114	7.248	32.35	189	32.796	55.10	193	37.898	29.86	77
19.8	42.203	68.08	97	7.569	30.96	139	33.122	53.66	144	38.215	30.54	68
Mar. 1.8	42.506	68.81	73	7.895	30.08	88	33.453	52.78	88	38.534	31.12	58
11.7	42.810	69.29	48	8.218	29.77	31	33.783	52.48	30	38.850	31.57	45
21.7	43.104	69.49	20	8.531	30.03	26	34.104	52.76	28	39.160	31.85	28
31.7	43.385	69.43	6	8.830	30.83	80	34.408	53.59	83	39.457	31.99	14
Apr. 10.7	43.652	69.11	32	9.110	32.13	130	34.694	54.93	134	39.742	31.99	0
20.6	43.901	68.58	53	9.364	33.87	174	34.954	56.73	180	40.010	31.86	13
30.6	44.129	67.86	72	9.592	35.98	211	35.185	58.92	219	40.257	31.61	23
May 10.6	44.332	66.99	87	9.788	38.36	238	35.383	61.39	247	40.482	31.29	32
20.5	44.509	66.02	97	9.949	40.95	259	35.545	64.06	267	40.679	30.91	38
30.5	44.657	64.99	103	10.073	43.65	272	35.669	66.85	279	40.846	30.50	41
June 9.5	44.772	63.93	106	10.158	46.37	272	35.753	69.66	281	40.981	30.08	42
19.5	44.852	62.88	105	10.203	49.04	267	35.794	72.43	277	41.080	29.66	42
29.4	44.898	61.88	100	10.205	51.57	253	35.793	75.06	268	41.140	29.27	39
July 9.4	44.906	60.94	94	10.166	53.93	236	35.749	77.50	244	41.161	28.91	36
19.4	44.877	60.09	85	10.087	56.04	211	35.664	79.67	217	41.143	28.57	34
29.4	44.813	59.33	76	9.970	57.86	182	35.540	81.56	189	41.087	28.26	31
Aug. 8.3	44.717	58.69	64	9.819	59.34	148	35.382	83.10	154	40.995	27.98	28
18.3	44.593	58.15	54	9.640	60.47	113	35.195	84.26	116	40.874	27.71	27
28.3	44.447	57.72	43	9.438	61.21	74	34.983	85.02	76	40.729	27.46	25
Sept. 7.2	44.285	57.41	31	9.221	61.55	34	34.758	85.36	34	40.565	27.22	24
17.2	44.118	57.24	17	8.998	61.48	7	34.526	85.29	7	40.394	26.99	23
27.2	43.955	57.19	5	8.779	61.01	47	34.297	84.79	50	40.225	26.77	22
Oct. 7.2	43.808	57.28	9	8.575	60.12	89	34.083	83.86	93	40.069	26.58	19
17.1	43.674	57.53	25	8.393	58.82	130	33.891	82.51	135	39.934	26.44	14
27.1	43.576	57.93	40	8.244	57.13	189	33.733	80.76	175	39.831	26.35	9
Nov. 6.1	43.518	58.50	57	8.135	55.09	204	33.616	78.64	212	39.768	26.34	1
16.1	43.503	59.25	75	8.074	52.73	236	33.547	76.19	245	39.751	26.44	10
26.0	43.536	60.16	91	8.066	50.09	264	33.531	73.47	272	39.782	26.67	23
Dec. 6.0	43.619	61.24	108	8.112	47.25	284	33.570	70.54	293	39.865	27.02	35
16.0	43.749	62.47	128	8.211	44.28	297	33.665	67.48	306	39.997	27.50	48
25.9	43.923	63.79	132	8.361	41.27	301	33.813	64.39	309	40.176	28.10	60
35.9	44.137	65.17	138	8.558	38.33	294	34.009	61.37	302	40.395	28.79	69
Mean Place	40.999	56.57		6.805	52.31		32.416	75.49		36.950	23.24	
Sec δ, Tan δ	1.003	-0.072		1.167	+0.602		1.202	+0.667		1.039	-0.280	
D <sub>φ</sub> α, D <sub>α</sub> α	+0.06	0.00		+0.05	+0.01		+0.04	+0.01		+0.07	0.00	
D <sub>φ</sub> δ, D <sub>δ</sub> δ	-0.1	-1.0		-0.1	-1.0		-0.1	-1.0		-0.1	-1.0	

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	7 Scorpi. Mag. 3.4		ζ Draconis. Mag. 3.2		α Herculis. Var. 3.1-3.9		δ Herculis. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 6	° ' " -43 7	h m 17 8	° ' " +65 48	h m 17 10	° ' " +14 28	h m 17 11	° ' " +24 55
	s	"	s	"	s	"	s	"
Jan. 0.9	11.984	51.94	29.73	48.32	51.342	54.99	36.736	61.96
10.9	12.296 <sup>312</sup>	51.19 <sup>75</sup>	30.00 <sup>27</sup>	44.92 <sup>340</sup>	51.555 <sup>213</sup>	52.74 <sup>225</sup>	36.947 <sup>211</sup>	59.28 <sup>268</sup>
20.9	12.647 <sup>351</sup>	50.64 <sup>55</sup>	30.37 <sup>37</sup>	41.83 <sup>309</sup>	51.800 <sup>245</sup>	50.62 <sup>191</sup>	37.192 <sup>245</sup>	56.79 <sup>249</sup>
30.9	13.026 <sup>379</sup>	50.30 <sup>34</sup>	30.82 <sup>45</sup>	39.16 <sup>267</sup>	52.070 <sup>270</sup>	48.71 <sup>191</sup>	37.465 <sup>273</sup>	54.58 <sup>221</sup>
Feb. 9.8	13.427 <sup>401</sup>	50.17 <sup>13</sup>	31.33 <sup>51</sup>	37.00 <sup>216</sup>	52.356 <sup>286</sup>	47.09 <sup>162</sup>	37.758 <sup>293</sup>	52.72 <sup>186</sup>
	411	6	55	156	297	126	306	142
19.8	13.838	50.23	31.88	35.44	52.653	45.83	38.064	51.30
Mar. 1.8	14.253 <sup>415</sup>	50.47 <sup>24</sup>	32.45 <sup>57</sup>	34.54 <sup>90</sup>	52.955 <sup>302</sup>	44.97 <sup>86</sup>	38.376 <sup>312</sup>	50.38 <sup>92</sup>
11.7	14.665 <sup>412</sup>	50.86 <sup>39</sup>	33.03 <sup>58</sup>	34.32 <sup>22</sup>	53.255 <sup>300</sup>	44.55 <sup>42</sup>	38.687 <sup>311</sup>	49.96 <sup>42</sup>
21.7	15.069 <sup>404</sup>	51.39 <sup>53</sup>	33.60 <sup>57</sup>	34.78 <sup>46</sup>	53.550 <sup>295</sup>	44.56 <sup>1</sup>	38.992 <sup>305</sup>	50.07 <sup>11</sup>
31.7	15.459 <sup>390</sup>	52.06 <sup>67</sup>	34.14 <sup>54</sup>	35.89 <sup>111</sup>	53.834 <sup>284</sup>	45.01 <sup>45</sup>	39.286 <sup>294</sup>	50.69 <sup>62</sup>
	372	78	50	171	270	86	279	109
Apr. 10.7	15.831	52.84	34.64	37.60	54.104	45.87	39.565	51.78
20.6	16.180 <sup>349</sup>	53.71 <sup>87</sup>	35.08 <sup>44</sup>	39.84 <sup>224</sup>	54.356 <sup>252</sup>	47.09 <sup>122</sup>	39.823 <sup>258</sup>	53.30 <sup>152</sup>
30.6	16.503 <sup>323</sup>	54.67 <sup>96</sup>	35.45 <sup>37</sup>	42.52 <sup>268</sup>	54.587 <sup>231</sup>	48.60 <sup>151</sup>	40.058 <sup>235</sup>	55.17 <sup>187</sup>
May 10.6	16.794 <sup>291</sup>	55.72 <sup>105</sup>	35.75 <sup>30</sup>	45.54 <sup>302</sup>	54.792 <sup>205</sup>	50.36 <sup>176</sup>	40.266 <sup>208</sup>	57.33 <sup>216</sup>
20.6	17.049 <sup>255</sup>	56.84 <sup>112</sup>	35.97 <sup>22</sup>	48.79 <sup>325</sup>	54.971 <sup>179</sup>	52.29 <sup>193</sup>	40.442 <sup>176</sup>	59.69 <sup>236</sup>
	215	116	13	339	147	204	142	248
30.5	17.264	58.00	36.10	52.18	55.118	54.33	40.584	62.17
June 9.5	17.435 <sup>171</sup>	59.19 <sup>119</sup>	36.14 <sup>4</sup>	55.59 <sup>341</sup>	55.231 <sup>113</sup>	56.40 <sup>207</sup>	40.690 <sup>106</sup>	64.70 <sup>253</sup>
19.5	17.559 <sup>124</sup>	60.39 <sup>120</sup>	36.09 <sup>5</sup>	58.94 <sup>335</sup>	55.308 <sup>77</sup>	58.45 <sup>205</sup>	40.756 <sup>66</sup>	67.19 <sup>249</sup>
29.4	17.631 <sup>72</sup>	61.54 <sup>115</sup>	35.95 <sup>12</sup>	62.13 <sup>319</sup>	55.348 <sup>40</sup>	60.42 <sup>197</sup>	40.783 <sup>27</sup>	69.59 <sup>240</sup>
July 9.4	17.653 <sup>22</sup>	62.65 <sup>111</sup>	35.74 <sup>21</sup>	65.07 <sup>294</sup>	55.350 <sup>2</sup>	62.26 <sup>184</sup>	40.769 <sup>14</sup>	71.83 <sup>224</sup>
	31	101	30	263	36	166	53	203
19.4	17.622	63.66	35.44	67.70	55.314	63.92	40.716	73.86
29.4	17.540 <sup>82</sup>	64.54 <sup>88</sup>	35.07 <sup>37</sup>	69.96 <sup>226</sup>	55.240 <sup>74</sup>	65.39 <sup>147</sup>	40.625 <sup>91</sup>	75.63 <sup>177</sup>
Aug. 8.3	17.413 <sup>127</sup>	65.23 <sup>89</sup>	34.64 <sup>43</sup>	71.80 <sup>184</sup>	55.133 <sup>107</sup>	66.62 <sup>123</sup>	40.498 <sup>127</sup>	77.12 <sup>149</sup>
18.3	17.246 <sup>167</sup>	65.73 <sup>50</sup>	34.15 <sup>49</sup>	73.18 <sup>138</sup>	54.998 <sup>135</sup>	67.60 <sup>98</sup>	40.342 <sup>156</sup>	78.28 <sup>116</sup>
28.3	17.048 <sup>198</sup>	65.98 <sup>25</sup>	33.62 <sup>53</sup>	74.06 <sup>88</sup>	54.838 <sup>160</sup>	68.30 <sup>70</sup>	40.162 <sup>180</sup>	79.10 <sup>82</sup>
	221	1	55	38	175	44	197	47
Sept. 7.3	16.827	65.99	33.07	74.44	54.663	68.74	39.965	79.57
17.2	16.597 <sup>230</sup>	65.73 <sup>26</sup>	32.52 <sup>55</sup>	74.29 <sup>15</sup>	54.479 <sup>184</sup>	68.87 <sup>13</sup>	39.759 <sup>206</sup>	79.66 <sup>9</sup>
27.2	16.370 <sup>227</sup>	65.22 <sup>51</sup>	31.97 <sup>55</sup>	73.62 <sup>67</sup>	54.296 <sup>183</sup>	68.70 <sup>17</sup>	39.555 <sup>204</sup>	79.37 <sup>29</sup>
Oct. 7.2	16.160 <sup>210</sup>	64.45 <sup>77</sup>	31.44 <sup>53</sup>	72.43 <sup>119</sup>	54.124 <sup>172</sup>	68.24 <sup>46</sup>	39.361 <sup>194</sup>	78.70 <sup>67</sup>
17.1	15.979 <sup>181</sup>	63.47 <sup>98</sup>	30.94 <sup>50</sup>	70.73 <sup>170</sup>	53.971 <sup>153</sup>	67.47 <sup>77</sup>	39.188 <sup>173</sup>	77.67 <sup>103</sup>
	141	117	44	217	123	107	144	139
27.1	15.838	62.30	30.50	68.56	53.848	66.40	39.044	76.28
Nov. 6.1	15.750 <sup>88</sup>	61.02 <sup>128</sup>	30.13 <sup>37</sup>	65.97 <sup>259</sup>	53.761 <sup>87</sup>	65.06 <sup>134</sup>	38.938 <sup>106</sup>	74.53 <sup>175</sup>
16.1	15.721 <sup>20</sup>	59.65 <sup>137</sup>	29.84 <sup>29</sup>	62.99 <sup>208</sup>	53.717 <sup>44</sup>	63.43 <sup>163</sup>	38.876 <sup>62</sup>	72.47 <sup>206</sup>
26.0	15.756 <sup>35</sup>	58.27 <sup>138</sup>	29.64 <sup>20</sup>	59.71 <sup>328</sup>	53.720 <sup>3</sup>	61.58 <sup>185</sup>	38.864 <sup>12</sup>	70.15 <sup>232</sup>
Dec. 6.0	15.859 <sup>103</sup>	56.95 <sup>132</sup>	29.55 <sup>9</sup>	56.20 <sup>351</sup>	53.772 <sup>52</sup>	59.51 <sup>207</sup>	38.902 <sup>38</sup>	67.60 <sup>255</sup>
	167	122	1	362	100	220	89	269
16.0	16.026	55.73	29.56	52.58	53.872	57.31	38.991	64.91
26.0	16.252 <sup>226</sup>	54.66 <sup>107</sup>	29.68 <sup>12</sup>	48.94 <sup>364</sup>	54.019 <sup>147</sup>	55.03 <sup>228</sup>	39.130 <sup>139</sup>	62.16 <sup>275</sup>
35.9	16.533 <sup>281</sup>	53.76 <sup>90</sup>	29.90 <sup>22</sup>	45.43 <sup>351</sup>	54.206 <sup>187</sup>	52.75 <sup>228</sup>	39.312 <sup>182</sup>	59.43 <sup>273</sup>
Mean Place	12.319	52.14	32.643	60.27	51.730	62.46	37.296	70.61
Sec δ, Tan δ	1.370	-0.937	2.441	+2.227	1.033	+0.258	1.103	+0.465
Dψ α, Dω α	+0.09	-0.01	0.00	+0.03	+0.05	0.00	+0.05	+0.01
Dψ δ, Dω δ	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi$ Herculis. Mag. 3.4		$\theta$ Ophiuchi. Mag. 3.4		$\omega$ Herculis. Mag. 5.4		$\beta$ Arae. Mag. 2.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 12	° ' " +36 53	h m 17 16	° ' " -24 55	h m 17 17	° ' " +32 34	h m 17 18	° ' " -55 27
	s	"	s	"	s	"	s	"
Jan. 0.9	8.457	57.33	54.416	6.40	32.412	16.26	23.168	8.73
10.9	8.668 <sup>211</sup>	54.29 <sup>304</sup>	54.666 <sup>250</sup>	6.57 <sup>17</sup>	32.618 <sup>206</sup>	13.31 <sup>295</sup>	23.531 <sup>363</sup>	7.23 <sup>150</sup>
20.9	8.922 <sup>254</sup>	51.47 <sup>282</sup>	54.947 <sup>281</sup>	6.84 <sup>27</sup>	32.863 <sup>245</sup>	10.56 <sup>275</sup>	23.948 <sup>417</sup>	5.98 <sup>125</sup>
30.9	9.208 <sup>286</sup>	49.00 <sup>247</sup>	55.254 <sup>307</sup>	7.18 <sup>34</sup>	33.138 <sup>275</sup>	8.12 <sup>244</sup>	24.407 <sup>459</sup>	5.00 <sup>98</sup>
Feb. 9.8	9.521 <sup>313</sup>	46.95 <sup>205</sup>	55.577 <sup>323</sup>	7.56 <sup>38</sup>	33.439 <sup>301</sup>	6.08 <sup>204</sup>	24.896 <sup>489</sup>	4.32 <sup>68</sup>
	329	155	333	39	316	156	508	40
19.8	9.850	45.40	55.910	7.95	33.755	4.52	25.404	3.92
Mar. 1.8	10.188 <sup>338</sup>	44.43 <sup>97</sup>	56.247 <sup>337</sup>	8.33 <sup>38</sup>	34.081 <sup>326</sup>	3.49 <sup>103</sup>	25.922 <sup>518</sup>	3.81 <sup>11</sup>
	338	38	337	34	327	45	519	16
11.8	10.526 <sup>333</sup>	44.05 <sup>21</sup>	56.584 <sup>331</sup>	8.67 <sup>30</sup>	34.408 <sup>322</sup>	3.04 <sup>11</sup>	26.441 <sup>513</sup>	3.97 <sup>42</sup>
21.7	10.859 <sup>320</sup>	44.26 <sup>79</sup>	56.915 <sup>322</sup>	8.97 <sup>23</sup>	34.730 <sup>310</sup>	3.15 <sup>67</sup>	26.954 <sup>498</sup>	4.39 <sup>68</sup>
31.7	11.179 <sup>300</sup>	45.05 <sup>134</sup>	57.237 <sup>308</sup>	9.20 <sup>18</sup>	35.040 <sup>294</sup>	3.82 <sup>119</sup>	27.452 <sup>476</sup>	5.07 <sup>89</sup>
Apr. 10.7	11.479	46.39	57.545	9.38	35.334	5.01	27.928	5.96
20.6	11.756 <sup>277</sup>	48.20 <sup>181</sup>	57.837 <sup>292</sup>	9.52 <sup>14</sup>	35.607 <sup>273</sup>	6.67 <sup>166</sup>	28.379 <sup>451</sup>	7.07 <sup>111</sup>
30.6	12.004 <sup>248</sup>	50.42 <sup>222</sup>	58.110 <sup>273</sup>	9.63 <sup>11</sup>	35.854 <sup>247</sup>	8.73 <sup>206</sup>	28.796 <sup>417</sup>	8.37 <sup>130</sup>
May 10.6	12.219 <sup>215</sup>	52.97 <sup>255</sup>	58.359 <sup>249</sup>	9.71 <sup>8</sup>	36.070 <sup>216</sup>	11.10 <sup>237</sup>	29.173 <sup>377</sup>	9.83 <sup>146</sup>
20.6	12.397 <sup>178</sup>	55.74 <sup>277</sup>	58.580 <sup>221</sup>	9.79 <sup>8</sup>	36.253 <sup>183</sup>	13.71 <sup>261</sup>	29.504 <sup>331</sup>	11.44 <sup>161</sup>
	139	290	191	7	146	274	278	171
30.5	12.536 <sup>95</sup>	58.64 <sup>295</sup>	58.771 <sup>155</sup>	9.86 <sup>10</sup>	36.399 <sup>105</sup>	16.45 <sup>280</sup>	29.782 <sup>221</sup>	13.15 <sup>179</sup>
June 9.5	12.631 <sup>51</sup>	61.59 <sup>292</sup>	58.926 <sup>117</sup>	9.96 <sup>11</sup>	36.504 <sup>63</sup>	19.25 <sup>278</sup>	30.003 <sup>159</sup>	14.94 <sup>181</sup>
19.5	12.682 <sup>6</sup>	64.51 <sup>280</sup>	59.043 <sup>76</sup>	10.07 <sup>12</sup>	36.567 <sup>20</sup>	22.03 <sup>267</sup>	30.162 <sup>92</sup>	16.75 <sup>180</sup>
29.5	12.688 <sup>40</sup>	67.31 <sup>280</sup>	59.119 <sup>34</sup>	10.19 <sup>13</sup>	36.587 <sup>23</sup>	24.70 <sup>249</sup>	30.254 <sup>25</sup>	18.55 <sup>173</sup>
July 9.4	12.648 <sup>84</sup>	69.91 <sup>236</sup>	59.153 <sup>9</sup>	10.32 <sup>13</sup>	36.564 <sup>66</sup>	27.19 <sup>227</sup>	30.279 <sup>43</sup>	20.28 <sup>159</sup>
19.4	12.564 <sup>125</sup>	72.27 <sup>206</sup>	59.144 <sup>50</sup>	10.45 <sup>11</sup>	36.498 <sup>106</sup>	29.46 <sup>198</sup>	30.236 <sup>108</sup>	21.87 <sup>143</sup>
29.4	12.439 <sup>163</sup>	74.33 <sup>171</sup>	59.094 <sup>89</sup>	10.56 <sup>7</sup>	36.392 <sup>142</sup>	31.44 <sup>166</sup>	30.128 <sup>168</sup>	23.30 <sup>119</sup>
Aug. 8.3	12.276 <sup>194</sup>	76.04 <sup>132</sup>	59.005 <sup>124</sup>	10.63 <sup>2</sup>	36.250 <sup>176</sup>	33.10 <sup>129</sup>	29.960 <sup>221</sup>	24.49 <sup>92</sup>
18.3	12.082 <sup>221</sup>	77.36 <sup>93</sup>	58.881 <sup>151</sup>	10.65 <sup>4</sup>	36.074 <sup>201</sup>	34.39 <sup>92</sup>	29.739 <sup>263</sup>	25.41 <sup>60</sup>
28.3	11.861 <sup>238</sup>	78.29 <sup>49</sup>	58.730 <sup>172</sup>	10.61 <sup>11</sup>	35.873 <sup>220</sup>	35.31 <sup>51</sup>	29.476 <sup>292</sup>	26.01 <sup>24</sup>
Sept. 7.3	11.623 <sup>247</sup>	78.78 <sup>5</sup>	58.558 <sup>181</sup>	10.50 <sup>20</sup>	35.653 <sup>229</sup>	35.82 <sup>9</sup>	29.184 <sup>309</sup>	26.25 <sup>13</sup>
17.2	11.376 <sup>246</sup>	78.83 <sup>40</sup>	58.377 <sup>151</sup>	10.30 <sup>29</sup>	35.424 <sup>230</sup>	35.91 <sup>34</sup>	28.875 <sup>306</sup>	26.12 <sup>50</sup>
27.2	11.130 <sup>234</sup>	78.43 <sup>85</sup>	58.196 <sup>170</sup>	10.01 <sup>35</sup>	35.194 <sup>218</sup>	35.57 <sup>76</sup>	28.569 <sup>291</sup>	25.62 <sup>87</sup>
Oct. 7.2	10.896 <sup>212</sup>	77.58 <sup>128</sup>	58.026 <sup>149</sup>	9.66 <sup>40</sup>	34.976 <sup>199</sup>	34.81 <sup>118</sup>	28.278 <sup>255</sup>	24.75 <sup>121</sup>
17.2	10.684 <sup>180</sup>	76.30 <sup>171</sup>	57.877 <sup>116</sup>	9.26 <sup>43</sup>	34.777 <sup>168</sup>	33.63 <sup>159</sup>	28.023 <sup>206</sup>	23.54 <sup>151</sup>
27.1	10.504 <sup>140</sup>	74.59 <sup>211</sup>	57.761 <sup>75</sup>	8.83 <sup>43</sup>	34.609 <sup>130</sup>	32.04 <sup>196</sup>	27.817 <sup>143</sup>	22.03 <sup>174</sup>
Nov. 6.1	10.364 <sup>92</sup>	72.48 <sup>245</sup>	57.686 <sup>27</sup>	8.40 <sup>40</sup>	34.479 <sup>85</sup>	30.08 <sup>230</sup>	27.674 <sup>71</sup>	20.29 <sup>191</sup>
16.1	10.272 <sup>38</sup>	70.03 <sup>275</sup>	57.659 <sup>24</sup>	8.00 <sup>34</sup>	34.394 <sup>34</sup>	27.78 <sup>261</sup>	27.603 <sup>10</sup>	18.38 <sup>201</sup>
26.0	10.234 <sup>18</sup>	67.28 <sup>298</sup>	57.683 <sup>77</sup>	7.66 <sup>24</sup>	34.360 <sup>20</sup>	25.17 <sup>283</sup>	27.613 <sup>92</sup>	16.37 <sup>202</sup>
Dec. 6.0	10.252 <sup>74</sup>	64.30 <sup>313</sup>	57.760 <sup>130</sup>	7.42 <sup>14</sup>	34.380 <sup>75</sup>	22.34 <sup>299</sup>	27.705 <sup>174</sup>	14.35 <sup>196</sup>
16.0	10.326 <sup>130</sup>	61.17 <sup>318</sup>	57.890 <sup>179</sup>	7.28 <sup>2</sup>	34.455 <sup>127</sup>	19.35 <sup>305</sup>	27.879 <sup>280</sup>	12.39 <sup>184</sup>
26.0	10.456 <sup>181</sup>	57.99 <sup>312</sup>	58.069 <sup>222</sup>	7.26 <sup>9</sup>	34.582 <sup>174</sup>	16.30 <sup>302</sup>	28.129 <sup>319</sup>	10.55 <sup>166</sup>
35.9	10.637	54.87	58.291	7.35	34.756	13.28	28.448	8.89
Mean Place	9.316	67.14	54.620	4.13	33.166	25.28	23.824	9.79
Sec $\delta$ , Tan $\delta$	1.250	+0.751	1.103	-0.465	1.187	+0.639	1.763	-1.453
$D\phi a, D\omega a$	+0.04	+0.01	+0.07	-0.01	+0.04	+0.01	+0.10	-0.02
$D\phi \delta, D\omega \delta$	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Ophiuchi. Mag. 4.3		$\sigma$ Ophiuchi. Mag. 4.4		$\delta$ Aræ. Mag. 3.8		$\alpha$ Aræ. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 21	° ' " -24 6	h m 17 22	° ' " + 4 12	h m 17 23	° ' " -60 36	h m 17 25	° ' " -49 48
Jan. 0.9	17.738	3.09	23.449	36.12	35.15	57.78	24.871	41.95
10.9	17.982 <sup>244</sup>	3.29 <sup>20</sup>	23.659 <sup>210</sup>	34.37 <sup>175</sup>	35.54 <sup>39</sup>	55.98 <sup>180</sup>	25.190 <sup>319</sup>	40.68 <sup>127</sup>
20.9	18.258 <sup>276</sup>	3.57 <sup>28</sup>	23.898 <sup>239</sup>	32.70 <sup>167</sup>	36.01 <sup>47</sup>	54.45 <sup>183</sup>	25.557 <sup>367</sup>	39.62 <sup>106</sup>
30.9	18.560 <sup>302</sup>	3.91 <sup>34</sup>	24.162 <sup>264</sup>	31.16 <sup>154</sup>	36.52 <sup>55</sup>	53.22 <sup>123</sup>	25.962 <sup>405</sup>	38.79 <sup>83</sup>
Feb. 9.8	18.879 <sup>319</sup>	4.29 <sup>38</sup>	24.443 <sup>281</sup>	29.82 <sup>134</sup>	37.07 <sup>55</sup>	52.30 <sup>92</sup>	26.398 <sup>431</sup>	38.21 <sup>58</sup>
	330	38	292	106	58	58	450	35
19.8	19.209	4.67	24.735	28.76	37.65	51.72	26.843	37.86
Mar. 1.8	19.543 <sup>334</sup>	5.03 <sup>36</sup>	25.033 <sup>298</sup>	28.00 <sup>76</sup>	38.24 <sup>59</sup>	51.45 <sup>27</sup>	27.301 <sup>458</sup>	37.74 <sup>12</sup>
11.8	19.877 <sup>334</sup>	5.34 <sup>31</sup>	25.331 <sup>298</sup>	27.57 <sup>43</sup>	38.83 <sup>59</sup>	51.50 <sup>5</sup>	27.762 <sup>461</sup>	37.84 <sup>10</sup>
21.7	20.207 <sup>330</sup>	5.59 <sup>25</sup>	25.626 <sup>295</sup>	27.49 <sup>8</sup>	39.41 <sup>58</sup>	51.86 <sup>36</sup>	28.218 <sup>456</sup>	38.16 <sup>32</sup>
31.7	20.528 <sup>321</sup>	5.79 <sup>20</sup>	25.912 <sup>286</sup>	27.76 <sup>27</sup>	39.98 <sup>57</sup>	52.51 <sup>65</sup>	28.663 <sup>445</sup>	38.67 <sup>51</sup>
	308	14	274	00	55	94	429	70
Apr. 10.7	20.836	5.93	26.186	28.36	40.53	53.45	29.092	39.37
20.6	21.129 <sup>293</sup>	6.01 <sup>8</sup>	26.444 <sup>258</sup>	29.24 <sup>88</sup>	41.05 <sup>52</sup>	54.64 <sup>119</sup>	29.498 <sup>406</sup>	40.23 <sup>86</sup>
30.6	21.403 <sup>274</sup>	6.05 <sup>4</sup>	26.685 <sup>241</sup>	30.38 <sup>114</sup>	41.53 <sup>48</sup>	56.04 <sup>140</sup>	29.878 <sup>380</sup>	41.25 <sup>102</sup>
May 10.6	21.653 <sup>250</sup>	6.07 <sup>2</sup>	26.902 <sup>217</sup>	31.71 <sup>133</sup>	41.96 <sup>43</sup>	57.66 <sup>162</sup>	30.223 <sup>345</sup>	42.43 <sup>118</sup>
20.6	21.876 <sup>223</sup>	6.08 <sup>1</sup>	27.096 <sup>194</sup>	33.18 <sup>147</sup>	42.34 <sup>38</sup>	59.45 <sup>179</sup>	30.530 <sup>307</sup>	43.72 <sup>129</sup>
	194	2	164	156	32	192	262	139
30.5	22.070	6.10	27.260	34.74	42.66	61.37	30.792	45.11
June 9.5	22.228 <sup>158</sup>	6.12 <sup>2</sup>	27.391 <sup>131</sup>	36.33 <sup>159</sup>	42.92 <sup>26</sup>	63.38 <sup>201</sup>	31.004 <sup>212</sup>	46.58 <sup>147</sup>
19.5	22.348 <sup>120</sup>	6.17 <sup>5</sup>	27.490 <sup>99</sup>	37.90 <sup>157</sup>	43.10 <sup>18</sup>	65.43 <sup>205</sup>	31.162 <sup>158</sup>	48.09 <sup>151</sup>
29.5	22.428 <sup>80</sup>	6.24 <sup>7</sup>	27.550 <sup>60</sup>	39.42 <sup>152</sup>	43.20 <sup>10</sup>	67.47 <sup>204</sup>	31.262 <sup>100</sup>	49.59 <sup>150</sup>
July 9.4	22.466 <sup>38</sup>	6.32 <sup>8</sup>	27.572 <sup>22</sup>	40.84 <sup>142</sup>	43.22 <sup>2</sup>	69.45 <sup>198</sup>	31.301 <sup>39</sup>	51.05 <sup>146</sup>
	5	8	16	130	5	185	21	137
19.4	22.461	6.40	27.556	42.14	43.17	71.30	31.280	52.42
29.4	22.415 <sup>46</sup>	6.48 <sup>8</sup>	27.502 <sup>54</sup>	43.28 <sup>114</sup>	43.04 <sup>13</sup>	72.95 <sup>165</sup>	31.201 <sup>79</sup>	53.64 <sup>122</sup>
Aug. 8.3	22.330 <sup>85</sup>	6.54 <sup>6</sup>	27.415 <sup>87</sup>	44.26 <sup>98</sup>	42.85 <sup>19</sup>	74.35 <sup>140</sup>	31.068 <sup>133</sup>	54.69 <sup>105</sup>
18.3	22.210 <sup>120</sup>	6.55 <sup>1</sup>	27.296 <sup>119</sup>	45.06 <sup>80</sup>	42.59 <sup>26</sup>	75.45 <sup>110</sup>	30.886 <sup>182</sup>	55.50 <sup>81</sup>
28.3	22.062 <sup>148</sup>	6.52 <sup>3</sup>	27.153 <sup>143</sup>	45.65 <sup>59</sup>	42.28 <sup>31</sup>	76.20 <sup>75</sup>	30.664 <sup>222</sup>	56.05 <sup>53</sup>
	170	10	163	41	34	86	251	25
Sept. 7.3	21.892	6.42	26.990	46.06	41.94	76.56	30.413	56.30
17.2	21.712 <sup>180</sup>	6.24 <sup>18</sup>	26.818 <sup>172</sup>	46.26 <sup>20</sup>	41.57 <sup>37</sup>	76.51 <sup>5</sup>	30.148 <sup>265</sup>	56.23 <sup>7</sup>
27.2	21.531 <sup>181</sup>	6.00 <sup>24</sup>	26.645 <sup>173</sup>	46.25 <sup>1</sup>	41.20 <sup>37</sup>	76.05 <sup>46</sup>	29.881 <sup>267</sup>	55.82 <sup>41</sup>
Oct. 7.2	21.361 <sup>170</sup>	5.68 <sup>32</sup>	26.481 <sup>164</sup>	46.02 <sup>23</sup>	40.86 <sup>34</sup>	75.16 <sup>89</sup>	29.628 <sup>253</sup>	55.10 <sup>72</sup>
17.2	21.211 <sup>150</sup>	5.32 <sup>36</sup>	26.334 <sup>147</sup>	45.58 <sup>44</sup>	40.56 <sup>30</sup>	73.90 <sup>126</sup>	29.403 <sup>225</sup>	54.09 <sup>101</sup>
	118	38	119	67	26	161	183	128
27.1	21.093	4.94	26.215	44.91	40.30	72.29	29.220	52.81
Nov. 6.1	21.015 <sup>78</sup>	4.56 <sup>38</sup>	26.131 <sup>84</sup>	44.03 <sup>88</sup>	40.12 <sup>18</sup>	70.40 <sup>189</sup>	29.092 <sup>128</sup>	51.33 <sup>148</sup>
16.1	20.983 <sup>32</sup>	4.21 <sup>35</sup>	26.089 <sup>42</sup>	42.93 <sup>110</sup>	40.02 <sup>10</sup>	68.29 <sup>211</sup>	29.027 <sup>65</sup>	49.70 <sup>163</sup>
26.0	21.002 <sup>79</sup>	3.92 <sup>29</sup>	26.093 <sup>4</sup>	41.64 <sup>129</sup>	40.00 <sup>2</sup>	66.05 <sup>224</sup>	29.033 <sup>6</sup>	47.99 <sup>171</sup>
Dec. 6.0	21.074 <sup>12</sup>	3.72 <sup>20</sup>	26.143 <sup>50</sup>	40.17 <sup>147</sup>	40.08 <sup>8</sup>	63.77 <sup>78</sup>	29.111 <sup>151</sup>	46.26 <sup>173</sup>
	124	10	99	163	19	224	151	166
16.0	21.198	3.62	26.242	38.54	40.27	61.53	29.262	44.60
26.0	21.371 <sup>173</sup>	3.63 <sup>1</sup>	26.384 <sup>142</sup>	36.84 <sup>170</sup>	40.53 <sup>26</sup>	59.41 <sup>212</sup>	29.481 <sup>219</sup>	43.04 <sup>156</sup>
35.9	21.588 <sup>217</sup>	3.74 <sup>11</sup>	26.568 <sup>184</sup>	35.09 <sup>175</sup>	40.88 <sup>35</sup>	57.46 <sup>195</sup>	29.763 <sup>282</sup>	41.63 <sup>141</sup>
Mean Place	17.948	0.68	23.753	41.90	36.038	59.05	25.373	42.21
Sec $\delta$ , Tan $\delta$	1.096	-0.447	1.003	+0.074	2.038	-1.776	1.550	-1.184
$D\psi\alpha$ , $D\omega\alpha$	+0.07	-0.01	+0.06	0.00	+0.11	-0.02	+0.09	-0.01
$D\psi\delta$ , $D\omega\delta$	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0	-0.1	-1.0



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time	$\lambda$ Hercules. Mag. 4.5			$\lambda$ Scorpi. Mag. 1.7			$\beta$ Draconis. Mag. 3.9			$\alpha$ Ophiuchi. Mag. 2.1		
	Right Ascension	Declina- tion		Right Ascension	Declina- tion		Right Ascension	Declina- tion		Right Ascension	Declina- tion	
	17 17	29	-26 20	17 17	29	-37 10	17 18	-50 11		17 31	-13 36	
Jan. 1.0	18 363	12 97		57 554	40 67		31 752	35 01		4 446	63 60	
10.9	18 568	10 26		58 201	40 06		31 955	31 23		4 643	61 57	
20.8	19 180	7 73		58 506	39 24		32 199	26 56		4 871	59 52	
30.7	19 402	5 45		59 262	38 34		32 533	23 17		5 119	57 47	
Feb. 4.5	19 967	3 53		59 199	38 16		32 828	19 41		5 422	56 19	
14.5	20 608	2 03		59 589	38 14		33 174	16 24		5 691	54 53	
24.5	21 375	1 03		60 347	38 21		33 622	13 49		5 989	54 06	
34.5	22 181	0 33		60 836	38 38		34 094	10 00		6 285	53 56	
Mar. 4.5	23 000	0 56		61 101	38 23		34 586	6 13		6 581	53 54	
14.5	23 900	1 15		61 086	38 45		35 090	2 36		6 871	53 53	
24.5	24 886	1 21		61 412	40 02		35 121	12 38		7 152	54 71	
34.5	25 856	3 11		61 707	40 11		35 679	19 33		7 413	55 55	
Apr. 4.5	26 806	5 56		62 030	41 01		36 282	26 32		7 659	57 29	
14.5	27 827	8 23		62 388	41 55		36 930	33 35		7 891	58 58	
24.5	28 915	10 15		62 675	43 01		37 622	40 35		8 109	60 28	
34.5	29 175	12 14		62 991	43 13		38 357	47 31		8 312	61 57	
May 4.5	30 386	15 38		63 336	43 36		39 135	54 23		8 501	63 25	
14.5	31 647	17 58		63 717	44 16		39 956	61 11		8 676	64 52	
24.5	32 957	19 46		64 131	45 06		40 819	67 54		8 838	66 18	
34.5	34 316	21 28		64 577	45 56		41 723	74 32		8 987	67 43	
June 4.5	35 723	23 02		65 055	46 46		42 667	81 05		9 124	68 67	
14.5	37 178	24 36		65 565	47 36		43 651	87 33		9 249	69 90	
24.5	38 681	26 08		66 507	48 26		44 674	93 56		9 362	71 12	
34.5	40 232	27 38		67 481	49 16		45 736	100 14		9 463	72 33	
July 4.5	41 833	29 07		68 487	50 06		46 837	106 27		9 552	73 53	
14.5	43 484	30 36		69 525	50 56		47 977	112 35		9 630	75 12	
24.5	45 185	32 05		70 595	51 46		49 156	118 38		9 697	76 30	
34.5	46 936	33 34		71 697	52 36		50 374	124 36		9 753	77 47	
Aug. 4.5	48 737	35 03		72 831	53 26		51 631	130 29		9 799	78 63	
14.5	50 588	36 32		73 997	54 16		52 927	136 17		9 835	79 78	
24.5	52 489	37 61		75 195	55 06		54 262	142 00		9 861	80 92	
34.5	54 440	38 90		76 425	55 56		55 636	147 48		9 878	82 05	
Sept. 4.5	56 441	40 20		77 687	56 46		57 049	153 41		9 886	83 17	
14.5	58 492	41 50		78 981	57 36		58 501	159 29		9 885	84 28	
24.5	60 593	43 20		80 307	58 26		60 002	165 12		9 875	85 38	
34.5	62 744	44 50		81 665	59 16		61 542	170 90		9 856	86 47	
Oct. 4.5	64 945	46 20		83 055	60 06		63 121	176 53		9 828	87 55	
14.5	67 196	47 50		84 487	60 56		64 739	182 51		9 791	89 02	
24.5	69 497	49 20		85 961	61 46		66 396	188 84		9 736	90 08	
34.5	71 848	50 50		87 477	62 36		68 092	194 72		9 673	91 13	
Nov. 4.5	74 249	52 20		89 035	63 26		69 827	200 55		9 593	92 17	
14.5	76 690	53 50		90 635	64 16		71 601	206 33		9 497	93 20	
24.5	79 181	55 20		92 277	65 06		73 413	212 06		9 386	94 22	
34.5	81 722	56 50		93 961	65 56		75 263	217 74		9 261	95 23	
Dec. 4.5	84 313	58 20		95 687	66 46		77 151	223 37		9 123	96 23	
14.5	86 954	59 50		97 455	67 36		79 077	228 95		8 973	97 22	
24.5	89 645	61 20		99 265	68 26		81 041	234 48		8 812	98 20	
34.5	92 386	62 50		101 117	69 16		83 043	240 06		8 640	99 17	
Mean Place	33 02	30 17		58 22	40 2		31 883	34 4		4 551	70 14	
Sec. 2. Tab. 2	1 114	-0 43		1 023	-0 33		1 022	-1 02		1 035	-0 24	
$D\alpha$ & $D\delta$	-0 17	0 0		-0 08	-0 01		-0 02	-0 01		-0 08	0 00	
$D\delta$ & $D\alpha$	-1 1	-1 0		-0 1	-1 0		-1 1	-1 0		-0 1	-1 0	

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\xi$ Serpentis. Mag. 3.6			$\zeta$ Herculis. Mag. 3.8			$\omega$ Draconis. Mag. 4.9			$\gamma$ Pavonis. Mag. 3.6		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	" ' "	h	m	" ' "	h	m	" ' "	h	m	" ' "
	17	32	-15 20	17	37	+46 2	17	37	+68 47	17	37	-64 40
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 1.0	49.718		53.42	6.016		51.45	22.44		38.01	33.76		68.17
10.9	49.938	220	54.06 64	6.203	187	48.16 329	22.67	23	34.55 346	34.17	41	66.07 210
20.9	50.190	252	54.73 67	6.442	239	45.09 307	23.01	34	31.31 324	34.66	49	64.21 186
30.9	50.466	276	55.40 67	6.725	283	42.35 274	23.44	43	28.44 287	35.22	56	62.66 155
Feb. 9.8	50.760	294	56.03 63	7.045	320	40.03 232	23.95	51	26.03 241	35.83	61	61.43 123
	307		54	347		180		57	185		64	90
19.8	51.067		56.57	7.392		38.23	24.52		24.18	36.47		60.53
Mar. 1.8	51.380	313	56.99 42	7.756	364	37.02 121	25.14	62	22.95 123	37.13	66	59.99 54
11.8	51.695	315	57.27 28	8.129	373	36.43 59	25.78	64	22.39 56	37.80	67	59.80 19
21.7	52.007	312	57.41 14	8.502	373	36.49 6	26.42	64	22.52 13	38.47	67	59.95 15
31.7	52.312	305	57.40 1	8.866	364	37.17 68	27.05	63	23.30 78	39.12	65	60.43 48
	296		16	346		128		59	143		63	80
Apr. 10.7	52.608		57.24	9.212		38.45	27.64		24.73	39.75		61.23
20.7	52.890	282	56.95 29	9.536	324	40.27 182	28.18	54	26.71 198	40.36	61	62.32 109
30.6	53.155	265	56.56 39	9.828	292	42.55 228	28.65	47	29.19 248	40.91	55	63.68 136
May 10.6	53.401	246	56.09 47	10.084	256	45.22 267	29.04	39	32.05 286	41.42	51	65.29 161
20.6	53.621	220	55.58 51	10.299	215	48.17 295	29.33	29	35.22 317	41.87	45	67.10 181
	192		54	168		314		21	337		39	199
30.5	53.813		55.04	10.467		51.31	29.54		38.59	42.26		69.09
June 9.5	53.972	159	54.51 53	10.585	118	54.54 323	29.65	11	42.05 346	42.57	31	71.22 213
19.5	54.095	123	54.01 50	10.652	67	57.77 323	29.65	0	45.51 346	42.79	22	73.41 219
29.5	54.180	85	53.54 47	10.665	13	60.92 315	29.55	10	48.87 336	42.92	13	75.63 222
July 9.4	54.226	46	53.12 42	10.625	40	63.89 297	29.34	21	52.05 318	42.96	4	77.80 217
	3		37	93		274		30	291		4	205
19.4	54.229		52.75	10.532		66.63	29.04		54.96	42.92		79.85
29.4	54.192	37	52.43 32	10.390	142	69.06 243	28.66	38	57.55 259	42.79	13	81.74 189
Aug. 8.4	54.117	75	52.16 27	10.202	188	71.14 208	28.20	46	59.75 220	42.58	21	83.37 163
18.3	54.007	110	51.94 22	9.976	226	72.83 169	27.67	53	61.53 178	42.29	29	84.71 134
28.3	53.870	137	51.73 21	9.716	260	74.08 125	27.09	58	62.84 131	41.93	36	85.69 98
	159		18	284		80		62	81		40	57
Sept. 7.3	53.711		51.55	9.432		74.88	26.47		63.65	41.53		86.26
17.2	53.540	171	51.38 17	9.134	298	75.20 32	25.82	65	63.95 30	41.11	42	86.39 13
27.2	53.366	174	51.23 15	8.833	301	75.02 18	25.17	65	63.72 23	40.68	43	86.06 33
Oct. 7.2	53.201	165	51.11 12	8.539	294	74.36 66	24.54	63	62.97 75	40.27	41	85.29 77
17.2	53.053	148	51.02 9	8.264	275	73.21 115	23.94	60	61.69 128	39.90	37	84.08 121
	120		4	244		162		55	178		32	159
27.1	52.933		50.98	8.020		71.59	23.39		59.91	39.58		82.49
Nov. 6.1	52.848	85	51.00 2	7.816	204	69.54 205	22.90	49	57.66 225	39.34	24	80.57 192
16.1	52.807	41	51.10 10	7.662	154	67.07 247	22.49	41	54.99 267	39.18	16	78.37 220
26.1	52.814	7	51.31 21	7.565	97	64.26 281	22.18	31	51.95 304	39.13	5	76.00 237
Dec. 6.0	52.869	55	51.62 31	7.527	38	61.16 310	21.99	19	48.64 331	39.18	5	73.53 247
	105		42	26		328		8	351		17	247
16.0	52.974		52.04	7.553		57.88	21.91		45.13	39.35		71.06
26.0	53.125	151	52.55 51	7.643	90	54.51 337	21.95	4	41.55 358	39.61	26	68.66 240
35.9	53.318	193	53.15 60	7.793	150	51.16 335	22.10	15	37.99 356	39.96	35	66.42 224
Mean Place	49.942		50.00	7.326		59.82	26.140		47.02	34.919		69.06
Sec $\delta$ , Tan $\delta$	1.037		-0.274	1.441		+1.037	2.765		+2.578	2.339		-2.114
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.07		0.00	+0.03		+0.01	-0.01		+0.02	+0.11		-0.07
$D_{\psi} \delta$ , $D_{\omega} \delta$	0.0		-1.0	0.0		-1.0	0.0		-1.0	0.0		-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Ophiuchi. Mag. 2.9		$\tau^1$ Scorpii. Mag. 3.1		$\mu$ Herculis. Mag. 3.5		$\psi$ Draconis. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 39 s	° ' " + 4 35 "	h m 17 41 s	° ' " -40 5 "	h m 17 43 s	° ' " +27 45 "	h m 17 43 s	° ' " +72 10 "
Jan. 1.0	21.976	58.55	46.402	46.89	11.871	59.55	20.03	75.90
10.9	22.168 <sup>192</sup>	56.83 <sup>172</sup>	46.664 <sup>262</sup>	46.02 <sup>87</sup>	12.049 <sup>178</sup>	56.77 <sup>278</sup>	20.26 <sup>23</sup>	71.83 <sup>347</sup>
20.9	22.394 <sup>226</sup>	55.18 <sup>165</sup>	46.966 <sup>302</sup>	45.31 <sup>71</sup>	12.266 <sup>217</sup>	54.15 <sup>262</sup>	20.61 <sup>35</sup>	68.56 <sup>327</sup>
30.9	22.646 <sup>252</sup>	53.66 <sup>152</sup>	47.301 <sup>335</sup>	44.74 <sup>57</sup>	12.516 <sup>250</sup>	51.76 <sup>239</sup>	21.08 <sup>47</sup>	65.64 <sup>292</sup>
Feb. 9.9	22.917 <sup>271</sup>	52.34 <sup>132</sup>	47.662 <sup>361</sup>	44.33 <sup>41</sup>	12.791 <sup>275</sup>	49.73 <sup>203</sup>	21.66 <sup>58</sup>	63.18 <sup>246</sup>
	285	105	377	27	293	161	65	191
19.8	23.202	51.29	48.039	44.06	13.084	48.12	22.31	61.27
Mar. 1.8	23.495 <sup>293</sup>	50.54 <sup>75</sup>	48.428 <sup>389</sup>	43.91 <sup>15</sup>	13.392 <sup>308</sup>	47.00 <sup>112</sup>	23.02 <sup>71</sup>	59.97 <sup>130</sup>
11.8	23.791 <sup>296</sup>	50.12 <sup>42</sup>	48.820 <sup>392</sup>	43.89 <sup>2</sup>	13.704 <sup>312</sup>	46.41 <sup>59</sup>	23.77 <sup>75</sup>	59.32 <sup>65</sup>
21.7	24.086 <sup>295</sup>	50.06 <sup>6</sup>	49.211 <sup>391</sup>	43.97 <sup>8</sup>	14.017 <sup>313</sup>	46.35 <sup>6</sup>	24.52 <sup>75</sup>	59.36 <sup>4</sup>
31.7	24.376 <sup>290</sup>	50.36 <sup>30</sup>	49.596 <sup>385</sup>	44.18 <sup>21</sup>	14.323 <sup>306</sup>	46.85 <sup>50</sup>	25.25 <sup>73</sup>	60.06 <sup>70</sup>
	280	63	376	31	297	99	69	133
Apr. 10.7	24.656	50.99	49.972	44.49	14.620	47.84	25.94	61.39
20.7	24.924 <sup>268</sup>	51.90 <sup>91</sup>	50.330 <sup>358</sup>	44.89 <sup>40</sup>	14.901 <sup>281</sup>	49.30 <sup>146</sup>	26.56 <sup>62</sup>	63.31 <sup>192</sup>
30.6	25.175 <sup>251</sup>	53.09 <sup>119</sup>	50.668 <sup>338</sup>	45.39 <sup>50</sup>	15.160 <sup>259</sup>	51.15 <sup>185</sup>	27.12 <sup>56</sup>	65.72 <sup>241</sup>
May 10.6	25.407 <sup>232</sup>	54.47 <sup>138</sup>	50.981 <sup>313</sup>	45.99 <sup>60</sup>	15.396 <sup>236</sup>	53.35 <sup>220</sup>	27.58 <sup>46</sup>	68.52 <sup>280</sup>
20.6	25.613 <sup>206</sup>	56.00 <sup>153</sup>	51.265 <sup>284</sup>	46.69 <sup>70</sup>	15.601 <sup>205</sup>	55.78 <sup>243</sup>	27.93 <sup>35</sup>	71.64 <sup>312</sup>
	179	163	247	78	171	261	24	332
30.6	25.792 <sup>147</sup>	57.63 <sup>167</sup>	51.512 <sup>207</sup>	47.47 <sup>85</sup>	15.772 <sup>136</sup>	58.39 <sup>268</sup>	28.17 <sup>11</sup>	74.96 <sup>344</sup>
June 9.5	25.939 <sup>112</sup>	59.30 <sup>165</sup>	51.719 <sup>201</sup>	48.32 <sup>91</sup>	15.908 <sup>96</sup>	61.07 <sup>270</sup>	28.28 <sup>0</sup>	78.40 <sup>344</sup>
19.5	26.051 <sup>75</sup>	60.95 <sup>159</sup>	51.880 <sup>113</sup>	49.23 <sup>95</sup>	16.004 <sup>53</sup>	63.77 <sup>261</sup>	28.28 <sup>13</sup>	81.84 <sup>336</sup>
29.5	26.126 <sup>36</sup>	62.54 <sup>150</sup>	51.993 <sup>63</sup>	50.18 <sup>96</sup>	16.057 <sup>9</sup>	66.38 <sup>249</sup>	28.15 <sup>24</sup>	85.20 <sup>319</sup>
July 9.4	26.162 <sup>2</sup>	64.04 <sup>137</sup>	52.056 <sup>9</sup>	51.14 <sup>93</sup>	16.066 <sup>33</sup>	68.87 <sup>230</sup>	27.91 <sup>36</sup>	88.39 <sup>294</sup>
19.4	26.160	65.41	52.065	52.07	16.033	71.17	27.55	91.33
29.4	26.118 <sup>42</sup>	66.64 <sup>123</sup>	52.023 <sup>42</sup>	52.92 <sup>85</sup>	15.958 <sup>75</sup>	73.22 <sup>205</sup>	27.09 <sup>46</sup>	93.95 <sup>262</sup>
Aug. 8.4	26.039 <sup>79</sup>	67.68 <sup>104</sup>	51.932 <sup>91</sup>	53.67 <sup>75</sup>	15.844 <sup>114</sup>	74.98 <sup>176</sup>	26.53 <sup>56</sup>	96.20 <sup>225</sup>
18.3	25.927 <sup>112</sup>	68.55 <sup>87</sup>	51.797 <sup>135</sup>	54.29 <sup>62</sup>	15.696 <sup>148</sup>	76.43 <sup>145</sup>	25.90 <sup>63</sup>	98.03 <sup>183</sup>
28.3	25.789 <sup>138</sup>	69.21 <sup>66</sup>	51.625 <sup>172</sup>	54.74 <sup>45</sup>	15.518 <sup>178</sup>	77.52 <sup>109</sup>	25.21 <sup>69</sup>	99.40 <sup>137</sup>
	160	47	200	23	199	72	75	88
Sept. 7.3	25.629	69.68	51.425	54.97	15.319	78.24	24.46	100.28
17.3	25.457 <sup>172</sup>	69.93 <sup>25</sup>	51.207 <sup>218</sup>	54.99 <sup>2</sup>	15.105 <sup>214</sup>	78.58 <sup>34</sup>	23.69 <sup>77</sup>	100.65 <sup>37</sup>
27.2	25.281 <sup>176</sup>	69.97 <sup>4</sup>	50.984 <sup>223</sup>	54.78 <sup>21</sup>	14.887 <sup>218</sup>	78.52 <sup>6</sup>	22.91 <sup>78</sup>	100.49 <sup>16</sup>
Oct. 7.2	25.110 <sup>171</sup>	69.79 <sup>18</sup>	50.772 <sup>212</sup>	54.34 <sup>44</sup>	14.676 <sup>211</sup>	78.07 <sup>45</sup>	22.15 <sup>74</sup>	99.81 <sup>68</sup>
17.2	24.957 <sup>153</sup>	69.40 <sup>39</sup>	50.577 <sup>195</sup>	53.68 <sup>85</sup>	14.479 <sup>197</sup>	77.22 <sup>85</sup>	21.41 <sup>76</sup>	98.61 <sup>120</sup>
	128	62	161	85	171	125	68	171
27.1	24.829	68.78	50.416	52.83	14.308	75.97	20.73	96.90
Nov. 6.1	24.732 <sup>97</sup>	67.94 <sup>84</sup>	50.299 <sup>117</sup>	51.82 <sup>101</sup>	14.170 <sup>138</sup>	74.35 <sup>162</sup>	20.13 <sup>60</sup>	94.72 <sup>218</sup>
16.1	24.676 <sup>56</sup>	66.89 <sup>105</sup>	50.234 <sup>65</sup>	50.70 <sup>112</sup>	14.075 <sup>95</sup>	72.38 <sup>197</sup>	19.62 <sup>51</sup>	92.10 <sup>262</sup>
26.1	24.664 <sup>12</sup>	65.63 <sup>126</sup>	50.227 <sup>7</sup>	49.51 <sup>119</sup>	14.026 <sup>49</sup>	70.11 <sup>227</sup>	19.22 <sup>40</sup>	89.12 <sup>298</sup>
Dec. 6.0	24.699 <sup>35</sup>	64.20 <sup>143</sup>	50.282 <sup>55</sup>	48.34 <sup>117</sup>	14.027 <sup>1</sup>	67.58 <sup>253</sup>	18.95 <sup>27</sup>	85.85 <sup>327</sup>
	62	159	116	115	52	270	14	349
16.0	24.781	62.61	50.398	47.19	14.079	64.88	18.81	82.36
26.0	24.907 <sup>126</sup>	60.93 <sup>168</sup>	50.573 <sup>175</sup>	46.12 <sup>107</sup>	14.180 <sup>101</sup>	62.07 <sup>281</sup>	18.81 <sup>0</sup>	78.79 <sup>357</sup>
36.0	25.075 <sup>168</sup>	59.23 <sup>170</sup>	50.801 <sup>228</sup>	45.16 <sup>96</sup>	14.329 <sup>149</sup>	59.26 <sup>281</sup>	18.95 <sup>14</sup>	75.25 <sup>354</sup>
Mean Place	22.313	63.81	46.752	45.73	12.573	66.42	24.658	83.68
Sec $\delta$ , Tan $\delta$	1.003	+0.080	1.307	-0.842	1.130	+0.527	3.270	+3.113
$D_{\psi} \alpha$ , $D_{\omega} \alpha$	+0.06	0.00	+0.08	0.00	+0.05	0.00	-0.02	+0.01
$D_{\psi} \delta$ , $D_{\omega} \delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Ophiuchi. Mag. 3.7		$\delta$ Herculis. Mag. 5.5		$\xi$ Draconis. Mag. 3.9		$\zeta$ Draconis. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 43	° ' " + 2 44	h m 17 52	° ' " +26 3	h m 17 52	° ' " +56 52	h m 17 53	° ' " +76 58
	s	"	s	"	s	"	s	"
Jan. 1.0	43.487	10.43	3.630	38.58	3.596	59.95	3.01	21.45
10.9	43.677	190 8.82	3.800	170 35.90	3.767	171 56.49	3.24	23 18.01
20.9	43.901	224 7.27	4.009	209 33.36	4.010	243 53.22	3.64	40 14.75
30.9	44.151	250 5.84	4.250	241 31.03	4.314	304 50.28	4.21	57 11.82
Feb. 9.9	44.420	269 4.59	4.518	268 29.04	4.671	357 47.76	4.93	72 9.32
	283	101	288	158	369	199	83	198
19.8	44.703	3.58	4.806	27.46	5.070	45.77	5.76	7.34
Mar. 1.8	44.995	292 2.86	5.108	302 26.34	5.498	428 44.38	6.68	92 5.96
11.8	45.291	296 2.47	5.416	308 25.72	5.945	447 43.62	7.65	97 5.22
21.7	45.586	295 2.40	5.726	310 25.64	6.397	452 43.55	8.65	100 5.15
31.7	45.877	291 2.66	6.032	306 26.09	6.842	445 44.13	9.63	98 5.74
	283	59	297	96	428	123	93	122
Apr. 10.7	46.160	3.25	6.329	27.05	7.270	45.35	10.56	6.96
20.7	46.430	270 4.11	6.613	284 28.45	7.669	399 47.15	11.41	85 8.76
30.6	46.683	253 5.23	6.877	264 30.26	8.030	361 49.45	12.15	74 11.07
May 10.6	46.918	235 6.53	7.119	242 32.40	8.345	315 52.18	12.77	62 13.79
20.6	47.129	211 7.98	7.332	213 34.79	8.606	261 55.24	13.26	49 16.85
	184	154	182	257	201	327	31	328
30.6	47.313	9.52	7.514	37.36	8.807	58.51	13.57	15 20.13
June 9.5	47.465	152 11.09	7.660	146 40.02	8.944	137 61.92	13.72	15 23.64
19.5	47.583	118 12.65	7.766	106 42.69	9.014	70 65.36	13.71	1 26.98
29.5	47.664	81 14.16	7.831	65 45.30	9.016	2 68.74	13.54	17 30.36
July 9.4	47.705	41 15.58	7.854	23 47.79	8.950	66 71.97	13.20	34 33.59
	3	130	21	232	132	299	49	299
19.4	47.708	16.88	7.833	50.11	8.818	74.96	12.71	36.58
29.4	47.671	37 18.02	7.770	63 52.18	8.621	197 77.66	12.08	63 39.29
Aug. 8.4	47.597	74 19.01	7.667	103 53.99	8.368	253 80.02	11.31	77 41.65
18.3	47.490	107 19.83	7.529	138 55.48	8.065	303 81.97	10.45	86 43.60
28.3	47.355	135 20.45	7.361	168 56.63	7.719	346 83.47	9.49	96 45.10
	157	45	191	80	377	108	103	103
Sept. 7.3	47.198	20.90	7.170	57.43	7.342	84.50	8.46	46.13
17.3	47.027	171 21.14	6.963	207 57.86	6.943	399 85.02	7.40	106 46.66
27.2	46.852	175 21.20	6.751	212 57.90	6.538	405 85.02	6.32	108 46.66
Oct. 7.2	46.684	168 21.04	6.543	208 57.55	6.139	389 84.50	5.25	107 46.15
17.2	46.529	155 20.70	6.348	195 56.81	5.757	372 83.47	4.21	104 45.12
	129	55	170	112	348	154	97	153
27.1	46.400	99 20.15	6.178	139 55.69	5.409	304 81.93	3.24	88 43.59
Nov. 6.1	46.301	58 19.38	6.039	99 54.20	5.105	248 79.90	2.36	88 41.58
16.1	46.243	14 18.42	5.940	53 52.38	4.857	247 77.43	1.62	74 39.12
26.1	46.229	14 17.26	5.887	53 50.24	4.675	284 74.59	1.00	62 36.29
Dec. 6.0	46.262	33 15.94	5.882	5 47.86	4.565	110 71.42	0.55	45 33.14
	79	146	46	258	32	338	27	337
16.0	46.341	124 14.48	5.928	94 45.28	4.533	47 68.04	0.28	8 29.77
26.0	46.465	165 12.92	6.022	141 42.59	4.580	123 64.53	0.20	8 26.28
36.0	46.630	160 11.32	6.163	271 39.88	4.703	350 61.03	0.30	10 22.79
Mean Place	43.813	15.38	4.310	44.75	5.684	67.24	9.799	28.71
Sec $\delta$ , Tan $\delta$	1.001	+0.048	1.113	+0.489	1.830	+1.533	4.437	+4.323
$D\psi \alpha$ , $D\omega \alpha$	+0.06	0.00	+0.05	0.00	+0.02	0.00	-0.05	+0.01
$D\psi \delta$ , $D\omega \delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Herculis. Mag. 4.0		$\nu$ Ophiuchi. Mag. 3.5		$\xi$ Herculis. Mag. 3.8		$\gamma$ Draconis. Mag. 2.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 53	° ' " 37 15	h m 17 54	° ' " 9 45	h m 17 54	° ' " 29 15	h m 17 54	° ' " 51 29
	s	"	s	"	s	"	s	"
Jan. 1.0	23.386	32.31	27.130	55.65	31.620	15.75	39.040	46.42
10.9	23.551 <sup>165</sup>	29.24 <sup>307</sup>	27.322 <sup>192</sup>	56.53 <sup>88</sup>	31.786 <sup>166</sup>	12.95 <sup>280</sup>	39.204 <sup>164</sup>	43.03 <sup>339</sup>
20.9	23.762 <sup>211</sup>	26.33 <sup>291</sup>	27.549 <sup>227</sup>	57.40 <sup>87</sup>	31.993 <sup>207</sup>	10.29 <sup>266</sup>	39.429 <sup>225</sup>	39.82 <sup>321</sup>
30.9	24.013 <sup>251</sup>	23.70 <sup>263</sup>	27.802 <sup>253</sup>	58.23 <sup>83</sup>	32.234 <sup>241</sup>	7.86 <sup>243</sup>	39.708 <sup>279</sup>	36.91 <sup>291</sup>
Feb. 9.9	24.294 <sup>281</sup>	21.43 <sup>227</sup>	28.075 <sup>273</sup>	58.96 <sup>73</sup>	32.504 <sup>270</sup>	5.78 <sup>208</sup>	40.032 <sup>324</sup>	34.42 <sup>249</sup>
	307	180	288	60	290	166	360	198
19.8	24.601	19.63	28.363	59.56	32.794	4.12	40.392	32.44
Mar. 1.8	24.925 <sup>324</sup>	18.36 <sup>127</sup>	28.661 <sup>298</sup>	59.99 <sup>43</sup>	33.099 <sup>305</sup>	2.94 <sup>118</sup>	40.778 <sup>386</sup>	31.04 <sup>140</sup>
11.8	25.259 <sup>334</sup>	17.67 <sup>69</sup>	28.964 <sup>303</sup>	60.22 <sup>23</sup>	33.413 <sup>314</sup>	2.29 <sup>65</sup>	41.179 <sup>401</sup>	30.27 <sup>77</sup>
21.8	25.596 <sup>337</sup>	17.57 <sup>10</sup>	29.268 <sup>304</sup>	60.25 <sup>3</sup>	33.729 <sup>316</sup>	2.20 <sup>9</sup>	41.585 <sup>406</sup>	30.16 <sup>11</sup>
31.7	25.929 <sup>333</sup>	18.08 <sup>51</sup>	29.570 <sup>302</sup>	60.06 <sup>19</sup>	34.042 <sup>313</sup>	2.65 <sup>45</sup>	41.986 <sup>401</sup>	30.71 <sup>55</sup>
	322	107	295	38	302	98	387	116
Apr. 10.7	26.251	19.15	29.865	59.68	34.344	3.63	42.373	31.87
20.7	26.556 <sup>305</sup>	20.74 <sup>159</sup>	30.150 <sup>285</sup>	59.13 <sup>55</sup>	34.634 <sup>290</sup>	5.08 <sup>145</sup>	42.735 <sup>362</sup>	33.60 <sup>173</sup>
30.6	26.840 <sup>284</sup>	22.79 <sup>205</sup>	30.422 <sup>272</sup>	58.42 <sup>71</sup>	34.905 <sup>271</sup>	6.95 <sup>167</sup>	43.068 <sup>333</sup>	35.84 <sup>224</sup>
May 10.6	27.094 <sup>254</sup>	25.20 <sup>241</sup>	30.674 <sup>252</sup>	57.60 <sup>82</sup>	35.151 <sup>246</sup>	9.17 <sup>222</sup>	43.361 <sup>293</sup>	38.50 <sup>266</sup>
20.6	27.316 <sup>222</sup>	27.92 <sup>272</sup>	30.905 <sup>231</sup>	56.71 <sup>89</sup>	35.367 <sup>216</sup>	11.67 <sup>250</sup>	43.608 <sup>247</sup>	41.48 <sup>298</sup>
	185	291	203	92	184	267	196	321
30.6	27.501 <sup>142</sup>	30.83 <sup>304</sup>	31.108 <sup>173</sup>	55.79 <sup>93</sup>	35.551 <sup>147</sup>	14.34 <sup>277</sup>	43.804 <sup>140</sup>	44.69 <sup>334</sup>
June 9.5	27.643 <sup>98</sup>	33.87 <sup>304</sup>	31.281 <sup>140</sup>	54.86 <sup>90</sup>	35.698 <sup>106</sup>	17.11 <sup>277</sup>	43.944 <sup>83</sup>	48.03 <sup>337</sup>
19.5	27.741 <sup>51</sup>	36.91 <sup>300</sup>	31.421 <sup>100</sup>	53.96 <sup>85</sup>	35.804 <sup>64</sup>	19.91 <sup>280</sup>	44.027 <sup>23</sup>	51.40 <sup>331</sup>
29.5	27.792 <sup>2</sup>	39.91 <sup>287</sup>	31.521 <sup>61</sup>	53.11 <sup>78</sup>	35.868 <sup>21</sup>	22.65 <sup>274</sup>	44.050 <sup>38</sup>	54.71 <sup>318</sup>
July 9.4	27.794 <sup>45</sup>	42.78 <sup>265</sup>	31.582 <sup>19</sup>	52.33 <sup>68</sup>	35.889 <sup>25</sup>	25.27 <sup>262</sup>	44.012 <sup>98</sup>	57.89 <sup>296</sup>
19.4	27.749	45.43	31.601	51.65	35.864	27.70	43.914	60.85
29.4	27.658 <sup>91</sup>	47.84 <sup>241</sup>	31.579 <sup>22</sup>	51.05 <sup>60</sup>	35.796 <sup>68</sup>	29.89 <sup>219</sup>	43.761 <sup>153</sup>	63.52 <sup>267</sup>
Aug. 8.4	27.524 <sup>134</sup>	49.92 <sup>206</sup>	31.518 <sup>61</sup>	50.55 <sup>50</sup>	35.688 <sup>108</sup>	29.89 <sup>191</sup>	43.761 <sup>206</sup>	63.52 <sup>233</sup>
18.3	27.351 <sup>173</sup>	51.65 <sup>173</sup>	31.422 <sup>96</sup>	50.13 <sup>42</sup>	35.544 <sup>144</sup>	31.80 <sup>158</sup>	43.555 <sup>252</sup>	65.85 <sup>194</sup>
28.3	27.145 <sup>206</sup>	53.00 <sup>135</sup>	31.294 <sup>128</sup>	49.80 <sup>33</sup>	35.368 <sup>176</sup>	33.38 <sup>158</sup>	43.303 <sup>289</sup>	67.79 <sup>150</sup>
	230	93	150	22	200	86	320	104
Sept. 7.3	26.915	53.93	31.144	49.57	35.168	35.47	42.694	70.33
17.3	26.669 <sup>246</sup>	54.42 <sup>49</sup>	30.977 <sup>167</sup>	49.40 <sup>17</sup>	34.952 <sup>216</sup>	35.47 <sup>47</sup>	42.694 <sup>339</sup>	70.33 <sup>55</sup>
27.2	26.417 <sup>252</sup>	54.46 <sup>4</sup>	30.804 <sup>173</sup>	49.30 <sup>10</sup>	34.730 <sup>222</sup>	35.98 <sup>4</sup>	42.355 <sup>347</sup>	70.88 <sup>4</sup>
Oct. 7.2	26.168 <sup>249</sup>	54.05 <sup>41</sup>	30.636 <sup>168</sup>	49.29 <sup>1</sup>	34.512 <sup>218</sup>	35.98 <sup>35</sup>	42.008 <sup>343</sup>	70.92 <sup>47</sup>
17.2	25.933 <sup>235</sup>	53.18 <sup>87</sup>	30.481 <sup>155</sup>	49.36 <sup>7</sup>	34.308 <sup>204</sup>	35.63 <sup>75</sup>	41.665 <sup>325</sup>	70.45 <sup>98</sup>
	208	131	131	16	181	117	296	147
27.1	25.725	51.87	30.350	49.52	34.127	33.71	41.044	68.00
Nov. 6.1	25.551 <sup>174</sup>	50.13 <sup>174</sup>	30.251 <sup>99</sup>	49.79 <sup>27</sup>	33.979 <sup>148</sup>	32.16 <sup>155</sup>	40.787 <sup>257</sup>	66.05 <sup>195</sup>
16.1	25.419 <sup>132</sup>	47.99 <sup>214</sup>	30.192 <sup>59</sup>	50.15 <sup>36</sup>	33.871 <sup>108</sup>	30.26 <sup>190</sup>	40.581 <sup>206</sup>	63.68 <sup>237</sup>
26.1	25.336 <sup>83</sup>	45.51 <sup>248</sup>	30.177 <sup>15</sup>	50.63 <sup>40</sup>	33.809 <sup>62</sup>	30.26 <sup>190</sup>	40.581 <sup>206</sup>	63.68 <sup>237</sup>
Dec. 6.0	25.306 <sup>30</sup>	42.75 <sup>276</sup>	30.209 <sup>32</sup>	51.23 <sup>68</sup>	33.796 <sup>13</sup>	28.02 <sup>224</sup>	40.434 <sup>147</sup>	60.91 <sup>277</sup>
	25	297	79	71	38	259	15	330
16.0	25.331	39.78	30.288	51.94	33.834	22.84	40.336	54.53
26.0	25.410 <sup>79</sup>	36.68 <sup>310</sup>	30.413 <sup>125</sup>	52.72 <sup>78</sup>	33.923 <sup>89</sup>	20.03 <sup>281</sup>	40.391 <sup>55</sup>	51.10 <sup>343</sup>
36.0	25.543 <sup>133</sup>	33.58 <sup>310</sup>	30.578 <sup>165</sup>	53.57 <sup>85</sup>	34.059 <sup>136</sup>	17.20 <sup>283</sup>	40.512 <sup>121</sup>	47.66 <sup>344</sup>
Mean Place	24.377	38.91	27.394	51.93	32.377	21.90	40.717	53.36
Sec $\delta$ , Tan $\delta$	1.257	+0.761	1.015	-0.172	1.146	+0.560	1.606	+1.257
$D\phi a$ , $D\omega a$	+0.04	0.00	+0.07	0.00	+0.05	0.00	+0.03	0.00
$\eta\phi\delta$ , $D\omega\delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	67 Ophiuchi. Mag. 3.9		$\theta$ Arae. Mag. 3.9		$\gamma$ Sagittarii. Mag. 3.1		70 Ophiuchi. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 17 56	° ' " + 2 55	h m 18 0	° ' " -50 5	h m 18 0	° ' " -30 25	h m 18 1	° ' " + 2 30
	s "	"	s "	"	s "	"	s "	"
Jan. 1.0	28.956	60.11	9.617	55.83	28.202	36.85	15.211	59.50
10.9	29.136 <sup>180</sup>	58.53 <sup>158</sup>	9.890 <sup>273</sup>	54.29 <sup>154</sup>	28.418 <sup>216</sup>	36.45 <sup>40</sup>	15.387 <sup>176</sup>	57.93 <sup>157</sup>
20.9	29.348 <sup>212</sup>	56.99 <sup>154</sup>	10.216 <sup>326</sup>	52.90 <sup>139</sup>	28.673 <sup>255</sup>	36.13 <sup>32</sup>	15.596 <sup>209</sup>	56.40 <sup>153</sup>
30.9	29.587 <sup>239</sup>	55.58 <sup>141</sup>	10.585 <sup>369</sup>	51.70 <sup>120</sup>	28.959 <sup>286</sup>	35.90 <sup>23</sup>	15.833 <sup>237</sup>	54.99 <sup>141</sup>
Feb. 9.9	29.849 <sup>262</sup>	54.35 <sup>123</sup>	10.989 <sup>404</sup>	50.69 <sup>101</sup>	29.269 <sup>310</sup>	35.71 <sup>19</sup>	16.092 <sup>259</sup>	53.76 <sup>123</sup>
	277	100	428	79	328	14	275	101
19.8	30.126	53.35	11.417	49.90	29.597	35.57	16.367	52.75
Mar. 1.8	30.414 <sup>288</sup>	52.65 <sup>70</sup>	11.863 <sup>446</sup>	49.32 <sup>58</sup>	29.937 <sup>340</sup>	35.46 <sup>11</sup>	16.654 <sup>287</sup>	52.03 <sup>72</sup>
11.8	30.707 <sup>293</sup>	52.27 <sup>38</sup>	12.319 <sup>456</sup>	48.94 <sup>38</sup>	30.283 <sup>346</sup>	35.36 <sup>10</sup>	16.947 <sup>293</sup>	51.62 <sup>41</sup>
21.8	31.002 <sup>295</sup>	52.21 <sup>6</sup>	12.779 <sup>460</sup>	48.79 <sup>15</sup>	30.632 <sup>349</sup>	35.28 <sup>8</sup>	17.243 <sup>296</sup>	51.55 <sup>7</sup>
31.7	31.295 <sup>293</sup>	52.50 <sup>29</sup>	13.235 <sup>456</sup>	48.85 <sup>6</sup>	30.979 <sup>347</sup>	35.21 <sup>7</sup>	17.537 <sup>294</sup>	51.81 <sup>26</sup>
	287	61	446	26	341	6	288	57
Apr. 10.7	31.582	53.11	13.681	49.11	31.320	35.15	17.825	52.38
20.7	31.858 <sup>276</sup>	54.00 <sup>89</sup>	14.113 <sup>432</sup>	49.56 <sup>45</sup>	31.651 <sup>331</sup>	35.10 <sup>5</sup>	18.104 <sup>279</sup>	53.23 <sup>85</sup>
30.6	32.120 <sup>262</sup>	55.15 <sup>115</sup>	14.523 <sup>410</sup>	50.21 <sup>65</sup>	31.965 <sup>314</sup>	35.09 <sup>1</sup>	18.368 <sup>264</sup>	54.34 <sup>111</sup>
May 10.6	32.364 <sup>244</sup>	56.49 <sup>134</sup>	14.906 <sup>383</sup>	51.03 <sup>82</sup>	32.261 <sup>296</sup>	35.12 <sup>3</sup>	18.615 <sup>247</sup>	55.64 <sup>130</sup>
20.6	32.585 <sup>221</sup>	57.98 <sup>149</sup>	15.253 <sup>347</sup>	52.03 <sup>100</sup>	32.533 <sup>272</sup>	35.21 <sup>9</sup>	18.841 <sup>226</sup>	57.10 <sup>146</sup>
	195	158	307	117	241	15	198	154
30.6	32.780	59.56	15.560	53.20	32.774	35.36	19.039	58.64
June 9.5	32.943 <sup>163</sup>	61.18 <sup>162</sup>	15.819 <sup>259</sup>	54.49 <sup>129</sup>	32.981 <sup>207</sup>	35.60 <sup>24</sup>	19.207 <sup>168</sup>	60.22 <sup>158</sup>
19.5	33.072 <sup>129</sup>	62.80 <sup>162</sup>	16.026 <sup>207</sup>	55.87 <sup>138</sup>	33.148 <sup>167</sup>	35.89 <sup>29</sup>	19.342 <sup>135</sup>	61.80 <sup>158</sup>
29.5	33.165 <sup>93</sup>	64.36 <sup>156</sup>	16.174 <sup>148</sup>	57.32 <sup>145</sup>	33.272 <sup>124</sup>	36.24 <sup>35</sup>	19.440 <sup>98</sup>	63.33 <sup>153</sup>
July 9.5	33.217 <sup>52</sup>	65.82 <sup>146</sup>	16.260 <sup>86</sup>	58.80 <sup>148</sup>	33.350 <sup>78</sup>	36.63 <sup>39</sup>	19.497 <sup>57</sup>	64.76 <sup>143</sup>
	13	135	24	145	31	43	17	132
19.4	33.230	67.17	16.284	60.25	33.381	37.06	19.514	66.08
29.4	33.202 <sup>28</sup>	68.36 <sup>119</sup>	16.246 <sup>38</sup>	61.63 <sup>138</sup>	33.364 <sup>17</sup>	37.50 <sup>44</sup>	19.491 <sup>23</sup>	67.24 <sup>116</sup>
Aug. 8.4	33.135 <sup>67</sup>	69.40 <sup>104</sup>	16.147 <sup>99</sup>	62.88 <sup>125</sup>	33.301 <sup>63</sup>	37.91 <sup>41</sup>	19.429 <sup>62</sup>	68.24 <sup>100</sup>
18.3	33.035 <sup>100</sup>	70.26 <sup>86</sup>	15.993 <sup>154</sup>	63.94 <sup>106</sup>	33.197 <sup>104</sup>	38.28 <sup>37</sup>	19.334 <sup>95</sup>	69.07 <sup>83</sup>
28.3	32.904 <sup>131</sup>	70.93 <sup>67</sup>	15.793 <sup>200</sup>	64.78 <sup>84</sup>	33.057 <sup>140</sup>	38.57 <sup>29</sup>	19.206 <sup>128</sup>	69.71 <sup>64</sup>
	153	48	236	57	170	18	150	46
Sept. 7.3	32.751	71.41	15.557	65.35	32.887	38.75	19.056	70.17
17.3	32.581 <sup>170</sup>	71.70 <sup>29</sup>	15.294 <sup>263</sup>	65.62 <sup>27</sup>	32.700 <sup>187</sup>	38.81 <sup>6</sup>	18.888 <sup>168</sup>	70.43 <sup>26</sup>
27.2	32.407 <sup>174</sup>	71.79 <sup>9</sup>	15.022 <sup>272</sup>	65.57 <sup>5</sup>	32.503 <sup>197</sup>	38.75 <sup>6</sup>	18.713 <sup>175</sup>	70.50 <sup>7</sup>
Oct. 7.2	32.235 <sup>172</sup>	71.68 <sup>11</sup>	14.753 <sup>269</sup>	65.17 <sup>40</sup>	32.310 <sup>193</sup>	38.54 <sup>21</sup>	18.541 <sup>172</sup>	70.36 <sup>14</sup>
17.2	32.077 <sup>158</sup>	71.35 <sup>33</sup>	14.505 <sup>248</sup>	64.46 <sup>71</sup>	32.133 <sup>177</sup>	38.21 <sup>33</sup>	18.383 <sup>158</sup>	70.03 <sup>33</sup>
	137	52	215	100	151	44	138	53
27.2	31.940	70.83	14.290	63.46	31.982	37.77	18.245	69.50
Nov. 6.1	31.835 <sup>105</sup>	70.10 <sup>73</sup>	14.122 <sup>168</sup>	62.18 <sup>126</sup>	31.867 <sup>115</sup>	37.23 <sup>54</sup>	18.138 <sup>107</sup>	68.76 <sup>74</sup>
16.1	31.768 <sup>67</sup>	69.17 <sup>93</sup>	14.012 <sup>110</sup>	60.70 <sup>148</sup>	31.797 <sup>70</sup>	36.64 <sup>59</sup>	18.068 <sup>70</sup>	67.83 <sup>93</sup>
26.1	31.744 <sup>24</sup>	68.04 <sup>113</sup>	13.969 <sup>43</sup>	59.05 <sup>165</sup>	31.776 <sup>21</sup>	36.01 <sup>63</sup>	18.040 <sup>28</sup>	66.71 <sup>112</sup>
Dec. 6.0	31.765 <sup>21</sup>	66.75 <sup>129</sup>	13.995 <sup>26</sup>	57.33 <sup>172</sup>	31.809 <sup>33</sup>	35.39 <sup>62</sup>	18.057 <sup>17</sup>	65.43 <sup>128</sup>
	67	143	99	175	86	58	63	142
16.0	31.832	65.32	14.094	55.58	31.895	34.81	18.120	64.01
26.0	31.943 <sup>111</sup>	63.79 <sup>153</sup>	14.261 <sup>167</sup>	53.86 <sup>172</sup>	32.034 <sup>139</sup>	34.28 <sup>53</sup>	18.227 <sup>107</sup>	62.49 <sup>152</sup>
36.0	32.096 <sup>153</sup>	62.21 <sup>158</sup>	14.494 <sup>233</sup>	52.24 <sup>162</sup>	32.219 <sup>185</sup>	33.82 <sup>46</sup>	18.378 <sup>151</sup>	60.93 <sup>156</sup>
Mean Place	29.302	64.66	10.166	54.79	28.482	34.56	15.559	63.87
Sec $\delta$ , Tan $\delta$	1.001	+0.051	1.559	-1.196	1.160	-0.587	1.001	+0.044
$D\psi\alpha$ , $D\omega\alpha$	+0.06	0.00	+0.09	0.00	+0.08	0.00	+0.06	0.00
$D\psi\delta$ , $D\omega\delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	72 Ophiuchi. Mag. 3.7			O Herculis. Mag. 3.8			$\mu$ Sagittarii. Mag. 4.0			$\eta$ Sagittarii. Mag. 3.2		
	Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.	
	h m 18 3	° ' " + 9 32		h m 18 4	° ' " +28 44		h m 18 8	° ' " -21 4		h m 18 12	° ' " -36 47	
	s	"		s	"		s	"		s	"	
Jan. 1.0	24.426	59.76	17.497	55.50	47.686	56.76	0.362	17.29				
11.0	24.593 <sup>167</sup>	57.84 <sup>192</sup>	17.653 <sup>156</sup>	52.72 <sup>278</sup>	47.878 <sup>192</sup>	56.89 <sup>13</sup>	0.579 <sup>217</sup>	16.45 <sup>84</sup>				
20.9	24.796 <sup>203</sup>	56.00 <sup>184</sup>	17.850 <sup>197</sup>	50.08 <sup>264</sup>	48.107 <sup>229</sup>	57.05 <sup>16</sup>	0.838 <sup>259</sup>	15.69 <sup>76</sup>				
30.9	25.026 <sup>230</sup>	54.31 <sup>169</sup>	18.081 <sup>231</sup>	47.65 <sup>243</sup>	48.365 <sup>258</sup>	57.23 <sup>18</sup>	1.132 <sup>294</sup>	15.04 <sup>65</sup>				
Feb. 9.9	25.281 <sup>255</sup>	52.83 <sup>148</sup>	18.343 <sup>262</sup>	45.55 <sup>210</sup>	48.646 <sup>281</sup>	57.39 <sup>16</sup>	1.453 <sup>321</sup>	14.47 <sup>57</sup>				
	272	118	283	169	300	12	344	47				
19.8	25.553	51.65	18.626	43.86	48.946	57.51	1.797	14.00				
Mar. 1.8	25.837 <sup>284</sup>	50.81 <sup>84</sup>	18.927 <sup>301</sup>	42.64 <sup>122</sup>	49.257 <sup>311</sup>	57.57 <sup>6</sup>	2.155 <sup>358</sup>	13.60 <sup>40</sup>				
11.8	26.128 <sup>291</sup>	50.34 <sup>47</sup>	19.237 <sup>310</sup>	41.94 <sup>70</sup>	49.576 <sup>319</sup>	57.55 <sup>2</sup>	2.523 <sup>368</sup>	13.29 <sup>31</sup>				
21.8	26.423 <sup>295</sup>	50.27 <sup>7</sup>	19.552 <sup>315</sup>	41.79 <sup>15</sup>	49.898 <sup>322</sup>	57.45 <sup>10</sup>	2.894 <sup>371</sup>	13.07 <sup>22</sup>				
31.7	26.716 <sup>293</sup>	50.60 <sup>33</sup>	19.865 <sup>313</sup>	42.19 <sup>40</sup>	50.220 <sup>322</sup>	57.26 <sup>19</sup>	3.267 <sup>373</sup>	12.91 <sup>16</sup>				
	288	71	305	92	317	28	368	8				
Apr. 10.7	27.004	51.31	20.170	43.11	50.537	56.98	3.635	12.83				
20.7	27.282 <sup>278</sup>	52.37 <sup>106</sup>	20.464 <sup>294</sup>	44.52 <sup>141</sup>	50.846 <sup>309</sup>	56.63 <sup>35</sup>	3.993 <sup>358</sup>	12.84 <sup>1</sup>				
30.7	27.546 <sup>264</sup>	53.72 <sup>135</sup>	20.740 <sup>276</sup>	46.35 <sup>183</sup>	51.143 <sup>297</sup>	56.23 <sup>40</sup>	4.336 <sup>343</sup>	12.93 <sup>9</sup>				
May 10.6	27.792 <sup>246</sup>	55.32 <sup>160</sup>	20.993 <sup>253</sup>	48.54 <sup>219</sup>	51.423 <sup>280</sup>	55.81 <sup>42</sup>	4.660 <sup>324</sup>	13.13 <sup>20</sup>				
20.6	28.016 <sup>224</sup>	57.11 <sup>179</sup>	21.218 <sup>225</sup>	50.99 <sup>245</sup>	51.680 <sup>257</sup>	55.39 <sup>42</sup>	4.958 <sup>298</sup>	13.43 <sup>30</sup>				
	196	191	194	267	231	40	267	41				
30.6	28.212	59.02	21.412	53.66	51.911	54.99	5.225	13.84				
June 9.5	28.376 <sup>164</sup>	60.99 <sup>197</sup>	21.569 <sup>157</sup>	56.42 <sup>276</sup>	52.110 <sup>199</sup>	54.64 <sup>35</sup>	5.458 <sup>233</sup>	14.35 <sup>51</sup>				
19.5	28.506 <sup>130</sup>	62.96 <sup>197</sup>	21.686 <sup>117</sup>	59.22 <sup>280</sup>	52.274 <sup>164</sup>	54.34 <sup>30</sup>	5.647 <sup>189</sup>	14.96 <sup>61</sup>				
29.5	28.600 <sup>94</sup>	64.88 <sup>192</sup>	21.760 <sup>74</sup>	61.98 <sup>276</sup>	52.397 <sup>123</sup>	54.10 <sup>24</sup>	5.791 <sup>144</sup>	15.64 <sup>68</sup>				
July 9.5	28.652 <sup>52</sup>	66.71 <sup>183</sup>	21.790 <sup>30</sup>	64.62 <sup>264</sup>	52.478 <sup>81</sup>	53.94 <sup>16</sup>	5.884 <sup>93</sup>	16.38 <sup>74</sup>				
	12	169	15	247	37	10	43	77				
19.4	28.664	68.40	21.775	67.09	52.515	53.84	5.927	17.15				
29.4	28.635 <sup>29</sup>	69.92 <sup>152</sup>	21.716 <sup>59</sup>	69.34 <sup>225</sup>	52.507 <sup>8</sup>	53.80 <sup>4</sup>	5.918 <sup>9</sup>	17.92 <sup>77</sup>				
Aug. 8.4	28.567 <sup>68</sup>	71.24 <sup>132</sup>	21.616 <sup>100</sup>	71.30 <sup>196</sup>	52.457 <sup>50</sup>	53.79 <sup>1</sup>	5.859 <sup>59</sup>	18.64 <sup>72</sup>				
18.4	28.463 <sup>104</sup>	72.34 <sup>110</sup>	21.479 <sup>137</sup>	72.94 <sup>164</sup>	52.366 <sup>91</sup>	53.81 <sup>2</sup>	5.753 <sup>106</sup>	19.29 <sup>65</sup>				
28.3	28.330 <sup>133</sup>	73.22 <sup>88</sup>	21.309 <sup>170</sup>	74.25 <sup>131</sup>	52.241 <sup>125</sup>	53.84 <sup>3</sup>	5.608 <sup>145</sup>	19.83 <sup>54</sup>				
	158	62	195	94	152	1	179	40				
Sept. 7.3	28.172	73.84	21.114	75.19	52.089	53.85	5.429	20.23				
17.3	27.998 <sup>174</sup>	74.22 <sup>38</sup>	20.901 <sup>213</sup>	75.74 <sup>55</sup>	51.917 <sup>172</sup>	53.84 <sup>1</sup>	5.228 <sup>201</sup>	20.44 <sup>21</sup>				
27.2	27.817 <sup>181</sup>	74.33 <sup>11</sup>	20.681 <sup>220</sup>	75.89 <sup>15</sup>	51.737 <sup>180</sup>	53.79 <sup>5</sup>	5.016 <sup>212</sup>	20.47 <sup>3</sup>				
Oct. 7.2	27.638 <sup>179</sup>	74.18 <sup>15</sup>	20.463 <sup>218</sup>	75.63 <sup>26</sup>	51.558 <sup>179</sup>	53.71 <sup>8</sup>	4.806 <sup>210</sup>	20.29 <sup>18</sup>				
17.2	27.472 <sup>166</sup>	73.78 <sup>40</sup>	20.258 <sup>205</sup>	74.96 <sup>67</sup>	51.393 <sup>165</sup>	53.59 <sup>12</sup>	4.608 <sup>198</sup>	19.92 <sup>37</sup>				
	146	68	185	107	144	15	172	56				
27.2	27.326	73.10	20.073	73.89	51.249	53.44	4.436	19.36				
Nov. 6.1	27.210 <sup>116</sup>	72.18 <sup>92</sup>	19.920 <sup>153</sup>	72.43 <sup>146</sup>	51.138 <sup>111</sup>	53.28 <sup>16</sup>	4.301 <sup>135</sup>	18.63 <sup>73</sup>				
16.1	27.132 <sup>78</sup>	71.00 <sup>118</sup>	19.806 <sup>114</sup>	70.61 <sup>182</sup>	51.068 <sup>70</sup>	53.12 <sup>16</sup>	4.211 <sup>90</sup>	17.79 <sup>84</sup>				
26.1	27.095 <sup>37</sup>	69.60 <sup>140</sup>	19.736 <sup>70</sup>	68.46 <sup>215</sup>	51.042 <sup>26</sup>	52.99 <sup>13</sup>	4.173 <sup>38</sup>	16.85 <sup>94</sup>				
Dec. 6.1	27.102 <sup>7</sup>	67.99 <sup>161</sup>	19.715 <sup>21</sup>	66.05 <sup>241</sup>	51.065 <sup>23</sup>	52.90 <sup>9</sup>	4.192 <sup>19</sup>	15.86 <sup>99</sup>				
	54	176	28	264	73	2	76	98				
16.0	27.156	66.23	19.743	63.41	51.138	52.88	4.268	14.88				
26.0	27.255 <sup>99</sup>	64.36 <sup>187</sup>	19.822 <sup>79</sup>	60.65 <sup>276</sup>	51.258 <sup>120</sup>	52.91 <sup>3</sup>	4.400 <sup>132</sup>	13.92 <sup>96</sup>				
36.0	27.395 <sup>140</sup>	62.45 <sup>191</sup>	19.947 <sup>125</sup>	57.85 <sup>280</sup>	51.422 <sup>164</sup>	53.00 <sup>9</sup>	4.583 <sup>183</sup>	13.02 <sup>90</sup>				
Mean Place	24.848	64.42	18.259	60.95	47.943	53.84	0.696	15.14				
Sec $\delta$ , Tan $\delta$	1.014	+0.168	1.141	+0.549	1.072	-0.386	1.249	-0.748				
$D\psi a$ , $D_w a$	+0.06	0.00	+0.05	0.00	+0.07	0.00	+0.08	0.00				
$D\psi \delta$ , $D_w \delta$	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0				

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	Groombridge 2533. Mag. 5.4		36 Draconis. Mag. 5.0		δ Sagittarii. Mag. 2.8		γ Serpentis. Mag. 3.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	18 13	+42 7	18 13	+64 21	18 15	-29 51	18 17	- 2 55
	s	"	s	"	s	"	s	"
Jan. 1.0	2.637	44.46	22.11	63.20	40.538	54.89	0.529	20.11
11.0	2.778 <sup>141</sup>	41.27 <sup>319</sup>	22.24 <sup>13</sup>	59.70 <sup>350</sup>	40.739 <sup>201</sup>	54.44 <sup>45</sup>	0.693 <sup>164</sup>	21.32 <sup>121</sup>
20.9	2.969 <sup>191</sup>	38.22 <sup>305</sup>	22.47 <sup>23</sup>	56.34 <sup>836</sup>	40.976 <sup>237</sup>	54.06 <sup>38</sup>	0.892 <sup>199</sup>	22.49 <sup>117</sup>
30.9	3.205 <sup>236</sup>	35.41 <sup>281</sup>	22.78 <sup>31</sup>	53.25 <sup>309</sup>	41.247 <sup>271</sup>	53.72 <sup>34</sup>	1.118 <sup>226</sup>	23.59 <sup>110</sup>
Feb. 9.9	3.479 <sup>274</sup>	32.97 <sup>244</sup>	23.17 <sup>39</sup>	50.54 <sup>271</sup>	41.545 <sup>298</sup>	53.44 <sup>28</sup>	1.368 <sup>250</sup>	24.55 <sup>96</sup>
	305	200	45	221	316	26	268	77
19.8	3.784	30.97	23.62	48.33	41.861	53.18	1.636	25.32
Mar. 1.8	4.112 <sup>328</sup>	29.50 <sup>147</sup>	24.12 <sup>50</sup>	46.69 <sup>164</sup>	42.192 <sup>331</sup>	52.94 <sup>24</sup>	1.918 <sup>282</sup>	25.86 <sup>54</sup>
11.8	4.457 <sup>345</sup>	28.63 <sup>87</sup>	24.65 <sup>53</sup>	45.69 <sup>100</sup>	42.533 <sup>341</sup>	52.72 <sup>22</sup>	2.208 <sup>290</sup>	26.13 <sup>27</sup>
21.8	4.811 <sup>354</sup>	28.37 <sup>26</sup>	25.20 <sup>55</sup>	45.35 <sup>34</sup>	42.878 <sup>345</sup>	52.49 <sup>23</sup>	2.503 <sup>295</sup>	26.14 <sup>1</sup>
31.7	5.163 <sup>352</sup>	28.72 <sup>35</sup>	25.75 <sup>55</sup>	45.68 <sup>33</sup>	43.224 <sup>346</sup>	52.27 <sup>22</sup>	2.798 <sup>295</sup>	25.86 <sup>28</sup>
	345	95	54	100	342	20	293	54
Apr. 10.7	5.508	29.67	26.29	46.68	43.566	52.07	3.091	25.32
20.7	5.840 <sup>332</sup>	31.17 <sup>150</sup>	26.79 <sup>50</sup>	48.27 <sup>159</sup>	43.900 <sup>334</sup>	51.87 <sup>20</sup>	3.377 <sup>286</sup>	24.53 <sup>79</sup>
30.7	6.150 <sup>310</sup>	33.18 <sup>201</sup>	27.25 <sup>46</sup>	50.41 <sup>214</sup>	44.222 <sup>322</sup>	51.70 <sup>17</sup>	3.652 <sup>275</sup>	23.54 <sup>99</sup>
May 10.6	6.432 <sup>282</sup>	35.61 <sup>243</sup>	27.66 <sup>41</sup>	53.02 <sup>261</sup>	44.525 <sup>303</sup>	51.59 <sup>11</sup>	3.911 <sup>259</sup>	22.38 <sup>116</sup>
20.6	6.680 <sup>248</sup>	38.36 <sup>275</sup>	27.99 <sup>33</sup>	56.01 <sup>299</sup>	44.807 <sup>282</sup>	51.54 <sup>5</sup>	4.151 <sup>240</sup>	21.11 <sup>127</sup>
	209	301	26	325	254	3	214	133
30.6	6.889	41.37	28.25	59.26	45.061	51.57	4.365	19.78
June 9.5	7.053 <sup>164</sup>	44.53 <sup>316</sup>	28.44 <sup>19</sup>	62.69 <sup>343</sup>	45.280 <sup>219</sup>	51.67 <sup>10</sup>	4.551 <sup>186</sup>	18.42 <sup>136</sup>
19.5	7.170 <sup>117</sup>	47.75 <sup>322</sup>	28.54 <sup>10</sup>	66.21 <sup>352</sup>	45.462 <sup>182</sup>	51.85 <sup>18</sup>	4.702 <sup>151</sup>	17.07 <sup>135</sup>
29.5	7.237 <sup>67</sup>	50.94 <sup>319</sup>	28.56 <sup>2</sup>	69.70 <sup>349</sup>	45.603 <sup>141</sup>	52.13 <sup>28</sup>	4.817 <sup>115</sup>	15.79 <sup>128</sup>
July 9.5	7.251 <sup>14</sup>	54.03 <sup>309</sup>	28.49 <sup>7</sup>	73.10 <sup>340</sup>	45.695 <sup>92</sup>	52.46 <sup>33</sup>	4.891 <sup>74</sup>	14.60 <sup>119</sup>
	37	291	16	320	45	39	33	109
19.4	7.214	56.94	28.33	76.30	45.740	52.85	4.924	13.51
29.4	7.126 <sup>88</sup>	59.60 <sup>266</sup>	28.08 <sup>25</sup>	79.25 <sup>295</sup>	45.738 <sup>2</sup>	53.26 <sup>41</sup>	4.916 <sup>8</sup>	12.54 <sup>97</sup>
Aug. 8.4	6.991 <sup>135</sup>	61.97 <sup>237</sup>	27.77 <sup>31</sup>	81.87 <sup>262</sup>	45.690 <sup>48</sup>	53.67 <sup>41</sup>	4.868 <sup>48</sup>	11.72 <sup>82</sup>
18.4	6.812 <sup>179</sup>	63.97 <sup>200</sup>	27.39 <sup>38</sup>	84.11 <sup>224</sup>	45.597 <sup>93</sup>	54.06 <sup>39</sup>	4.782 <sup>86</sup>	11.05 <sup>67</sup>
28.3	6.595 <sup>217</sup>	65.58 <sup>161</sup>	26.95 <sup>44</sup>	85.91 <sup>180</sup>	45.467 <sup>130</sup>	54.40 <sup>34</sup>	4.663 <sup>119</sup>	10.52 <sup>53</sup>
	245	119	48	134	162	24	144	38
Sept. 7.3	6.350	66.77	26.47	87.25	45.305	54.64	4.519	10.14
17.3	6.083 <sup>267</sup>	67.51 <sup>74</sup>	25.96 <sup>51</sup>	88.09 <sup>84</sup>	45.123 <sup>182</sup>	54.79 <sup>15</sup>	4.355 <sup>164</sup>	9.91 <sup>23</sup>
27.2	5.807 <sup>276</sup>	67.77 <sup>26</sup>	25.43 <sup>53</sup>	88.42 <sup>33</sup>	44.929 <sup>194</sup>	54.81 <sup>2</sup>	4.182 <sup>173</sup>	9.82 <sup>9</sup>
Oct. 7.2	5.530 <sup>277</sup>	67.56 <sup>21</sup>	24.90 <sup>53</sup>	88.21 <sup>21</sup>	44.736 <sup>193</sup>	54.70 <sup>11</sup>	4.009 <sup>173</sup>	9.87 <sup>5</sup>
17.2	5.266 <sup>294</sup>	66.87 <sup>69</sup>	24.39 <sup>51</sup>	87.46 <sup>75</sup>	44.554 <sup>182</sup>	54.45 <sup>25</sup>	3.847 <sup>162</sup>	10.07 <sup>20</sup>
	243	117	48	127	158	35	143	36
27.2	5.023	65.70	23.91	86.19	44.396	54.10	3.704	10.43
Nov. 6.1	4.813 <sup>210</sup>	64.07 <sup>103</sup>	23.47 <sup>44</sup>	84.41 <sup>178</sup>	44.271 <sup>125</sup>	53.64 <sup>46</sup>	3.589 <sup>115</sup>	10.93 <sup>50</sup>
16.1	4.644 <sup>169</sup>	62.01 <sup>206</sup>	23.10 <sup>37</sup>	82.16 <sup>225</sup>	44.189 <sup>82</sup>	53.11 <sup>53</sup>	3.510 <sup>79</sup>	11.58 <sup>65</sup>
26.1	4.523 <sup>121</sup>	59.58 <sup>243</sup>	22.80 <sup>30</sup>	79.48 <sup>268</sup>	44.153 <sup>36</sup>	52.54 <sup>57</sup>	3.472 <sup>38</sup>	15.38 <sup>80</sup>
Dec. 6.1	4.457 <sup>66</sup>	56.83 <sup>275</sup>	22.58 <sup>22</sup>	76.44 <sup>304</sup>	44.169 <sup>16</sup>	51.94 <sup>60</sup>	3.479 <sup>7</sup>	13.31 <sup>93</sup>
	10	301	11	330	70	58	51	106
16.0	4.447	53.82	22.47	73.14	44.239	51.36	3.530	14.37
26.0	4.496 <sup>49</sup>	50.66 <sup>316</sup>	22.45 <sup>2</sup>	69.65 <sup>349</sup>	44.360 <sup>121</sup>	50.82 <sup>54</sup>	3.625 <sup>95</sup>	15.53 <sup>116</sup>
36.0	4.601 <sup>105</sup>	47.45 <sup>321</sup>	22.52 <sup>7</sup>	66.12 <sup>353</sup>	44.528 <sup>168</sup>	50.33 <sup>49</sup>	3.762 <sup>137</sup>	16.72 <sup>119</sup>
Mean Place	3.849	49.53	25.151	68.30	40.823	52.34	0.847	16.45
Sec δ, Tan δ	1.348	+0.905	2.312	+2.084	1.153	-0.574	1.001	-0.051
Dψ α, Dω α	+0.04	0.00	+0.01	-0.01	+0.08	0.00	+0.06	0.00
Dψ δ, Dω δ	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Sagittarii. Mag. 2.0		109 Herculis. Mag. 3.9		α Telescopii. Mag. 3.8		χ Draconis. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 18	° ' " -34 25	h m 18 20	° ' " +21 43	h m 18 20	° ' " -46 0	h m 18 22	° ' " +72 41
	s	"	s	"	s	"	s	"
Jan. 1.0	39.439	31.95	9.015	47.38	48.699	57.68	28.34	45.44
11.0	39.643 <sup>204</sup>	31.23 <sup>72</sup>	9.158 <sup>143</sup>	44.90 <sup>248</sup>	48.928 <sup>220</sup>	56.24 <sup>144</sup>	28.45 <sup>11</sup>	41.94 <sup>350</sup>
20.9	39.889 <sup>246</sup>	30.56 <sup>67</sup>	9.341 <sup>183</sup>	42.52 <sup>238</sup>	49.207 <sup>279</sup>	54.91 <sup>133</sup>	28.70 <sup>25</sup>	38.54 <sup>340</sup>
30.9	40.169 <sup>280</sup>	29.97 <sup>59</sup>	9.557 <sup>216</sup>	40.33 <sup>219</sup>	49.529 <sup>322</sup>	53.72 <sup>119</sup>	29.08 <sup>38</sup>	35.39 <sup>315</sup>
Feb. 9.9	40.477 <sup>308</sup>	29.45 <sup>52</sup>	9.801 <sup>244</sup>	38.40 <sup>193</sup>	49.886 <sup>357</sup>	52.66 <sup>106</sup>	29.57 <sup>49</sup>	32.61 <sup>278</sup>
	329	45	267	157	382	90	60	231
19.9	40.806	29.00	10.068	36.83	50.268	51.76	30.17	30.30
Mar. 1.8	41.152 <sup>346</sup>	28.61 <sup>39</sup>	10.351 <sup>283</sup>	35.68 <sup>115</sup>	50.671 <sup>403</sup>	51.03 <sup>73</sup>	30.85 <sup>68</sup>	28.54 <sup>176</sup>
11.8	41.508 <sup>356</sup>	28.26 <sup>35</sup>	10.646 <sup>295</sup>	34.99 <sup>69</sup>	51.087 <sup>416</sup>	50.45 <sup>58</sup>	31.58 <sup>73</sup>	27.40 <sup>114</sup>
21.8	41.869 <sup>361</sup>	27.97 <sup>29</sup>	10.948 <sup>302</sup>	34.80 <sup>19</sup>	51.510 <sup>423</sup>	50.05 <sup>40</sup>	32.35 <sup>77</sup>	26.94 <sup>46</sup>
31.7	42.232 <sup>363</sup>	27.74 <sup>23</sup>	11.251 <sup>303</sup>	35.11 <sup>31</sup>	51.935 <sup>425</sup>	49.82 <sup>23</sup>	33.12 <sup>77</sup>	27.14 <sup>20</sup>
	359	18	300	78	421	8	75	85
Apr. 10.7	42.591	27.56	11.551	35.89	52.356	49.74	33.87	27.99
20.7	42.942 <sup>351</sup>	27.44 <sup>12</sup>	11.843 <sup>292</sup>	37.12 <sup>123</sup>	52.768 <sup>412</sup>	49.85 <sup>11</sup>	34.58 <sup>71</sup>	29.46 <sup>147</sup>
30.7	43.281 <sup>339</sup>	27.40 <sup>4</sup>	12.122 <sup>279</sup>	38.75 <sup>163</sup>	53.163 <sup>395</sup>	50.14 <sup>25</sup>	35.23 <sup>65</sup>	31.49 <sup>203</sup>
May 10.6	43.602 <sup>321</sup>	27.44 <sup>4</sup>	12.381 <sup>259</sup>	40.69 <sup>194</sup>	53.538 <sup>375</sup>	50.59 <sup>45</sup>	35.79 <sup>56</sup>	33.99 <sup>250</sup>
20.6	43.899 <sup>297</sup>	27.58 <sup>14</sup>	12.617 <sup>236</sup>	42.93 <sup>224</sup>	53.884 <sup>346</sup>	51.23 <sup>64</sup>	36.26 <sup>47</sup>	36.87 <sup>288</sup>
	267	25	206	240	310	80	36	320
30.6	44.166	27.83	12.825	45.33	54.194	52.03	36.62	40.07
June 9.6	44.398 <sup>232</sup>	28.17 <sup>34</sup>	13.000 <sup>175</sup>	47.84 <sup>251</sup>	54.463 <sup>269</sup>	52.97 <sup>94</sup>	36.86 <sup>24</sup>	43.45 <sup>338</sup>
19.5	44.591 <sup>193</sup>	28.61 <sup>44</sup>	13.138 <sup>138</sup>	50.41 <sup>257</sup>	54.685 <sup>222</sup>	54.04 <sup>107</sup>	36.97 <sup>11</sup>	46.94 <sup>349</sup>
29.5	44.739 <sup>148</sup>	29.14 <sup>53</sup>	13.236 <sup>98</sup>	52.93 <sup>252</sup>	54.853 <sup>168</sup>	55.23 <sup>119</sup>	36.96 <sup>1</sup>	50.44 <sup>350</sup>
July 9.5	44.838 <sup>99</sup>	29.74 <sup>60</sup>	13.292 <sup>56</sup>	55.36 <sup>243</sup>	54.964 <sup>111</sup>	56.47 <sup>124</sup>	36.83 <sup>13</sup>	53.85 <sup>341</sup>
	50	64	12	239	52	126	25	325
19.4	44.888	30.38	13.304	57.65	55.016	57.73	36.58	57.10
29.4	44.887 <sup>1</sup>	31.04 <sup>66</sup>	13.273 <sup>31</sup>	59.72 <sup>207</sup>	55.008 <sup>8</sup>	58.98 <sup>125</sup>	36.19 <sup>39</sup>	60.11 <sup>301</sup>
Aug. 8.4	44.836 <sup>51</sup>	31.68 <sup>64</sup>	13.200 <sup>73</sup>	61.57 <sup>185</sup>	54.942 <sup>66</sup>	60.14 <sup>116</sup>	35.71 <sup>48</sup>	62.81 <sup>270</sup>
18.4	44.739 <sup>97</sup>	32.26 <sup>58</sup>	13.089 <sup>111</sup>	63.13 <sup>156</sup>	54.823 <sup>119</sup>	61.18 <sup>104</sup>	35.14 <sup>57</sup>	65.16 <sup>235</sup>
28.3	44.602 <sup>137</sup>	32.76 <sup>50</sup>	12.946 <sup>143</sup>	64.38 <sup>125</sup>	54.655 <sup>168</sup>	62.06 <sup>88</sup>	34.48 <sup>66</sup>	67.08 <sup>192</sup>
	170	38	172	96	206	66	72	147
Sept. 7.3	44.432	33.14	12.774	65.33	54.449	62.72	33.76	68.55
17.3	44.239 <sup>193</sup>	33.36 <sup>22</sup>	12.585 <sup>189</sup>	65.93 <sup>60</sup>	54.216 <sup>233</sup>	63.13 <sup>41</sup>	33.00 <sup>76</sup>	69.53 <sup>98</sup>
27.3	44.035 <sup>204</sup>	33.42 <sup>6</sup>	12.386 <sup>199</sup>	66.17 <sup>24</sup>	53.967 <sup>249</sup>	63.26 <sup>13</sup>	32.20 <sup>80</sup>	70.00 <sup>47</sup>
Oct. 7.2	43.830 <sup>205</sup>	33.31 <sup>11</sup>	12.185 <sup>201</sup>	66.06 <sup>11</sup>	53.718 <sup>249</sup>	63.10 <sup>16</sup>	31.40 <sup>80</sup>	69.94 <sup>6</sup>
17.2	43.637 <sup>193</sup>	33.01 <sup>30</sup>	11.994 <sup>191</sup>	65.59 <sup>47</sup>	53.481 <sup>237</sup>	62.65 <sup>45</sup>	30.62 <sup>78</sup>	69.34 <sup>60</sup>
	169	46	171	84	208	74	75	112
27.2	43.468	32.55	11.823	64.75	53.273	61.91	29.87	68.22
Nov. 6.1	43.333 <sup>135</sup>	31.95 <sup>60</sup>	11.678 <sup>145</sup>	63.57 <sup>118</sup>	53.104 <sup>169</sup>	60.92 <sup>99</sup>	29.18 <sup>69</sup>	66.58 <sup>164</sup>
16.1	43.242 <sup>91</sup>	31.22 <sup>73</sup>	11.569 <sup>109</sup>	62.05 <sup>152</sup>	52.985 <sup>119</sup>	59.71 <sup>121</sup>	28.57 <sup>61</sup>	64.45 <sup>213</sup>
26.1	43.201 <sup>41</sup>	30.42 <sup>80</sup>	11.501 <sup>68</sup>	60.24 <sup>181</sup>	52.923 <sup>62</sup>	58.35 <sup>136</sup>	28.07 <sup>50</sup>	61.89 <sup>256</sup>
Dec. 6.1	43.214 <sup>13</sup>	29.58 <sup>84</sup>	11.478 <sup>23</sup>	58.16 <sup>208</sup>	52.926 <sup>3</sup>	56.88 <sup>147</sup>	27.69 <sup>38</sup>	58.95 <sup>294</sup>
	67	85	24	227	67	153	27	324
16.0	43.281	28.73	11.502	55.89	52.993	55.35	27.42	55.71
26.0	43.402 <sup>121</sup>	27.90 <sup>83</sup>	11.572 <sup>70</sup>	53.47 <sup>242</sup>	53.123 <sup>130</sup>	53.81 <sup>154</sup>	27.29 <sup>13</sup>	52.28 <sup>343</sup>
36.0	43.574 <sup>172</sup>	27.11 <sup>79</sup>	11.688 <sup>116</sup>	51.00 <sup>247</sup>	53.315 <sup>192</sup>	52.33 <sup>148</sup>	27.32 <sup>3</sup>	48.77 <sup>351</sup>
Mean Place	39.755	29.56	9.641	51.57	49.165	55.68	33.352	49.41
Sec δ, Tan δ	1.212	-0.685	1.076	+0.399	1.440	-1.036	3.362	+3.210
Dψ α, Dω α	+0.08	0.00	+0.05	0.00	+0.09	+0.01	-0.02	-0.02
Dψ δ, Dω δ	0.0	-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\lambda$ Sagittarii. Mag. 2.9		$\epsilon$ Serpentis. Mag. 5.4		1 Aquilæ. Mag. 4.1		$\zeta$ Pavonis. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 22	° ' -25 28	h m 18 25	° ' - 2 2	h m 18 30	° ' - 8 18	h m 18 33	° ' -71 29
	s "	"	s "	"	s "	"	s "	"
Jan. 1.0	50.642	10.44	21.467	27.25	41.128	14.28	18.54	65.91
11.0	50.826 <sup>184</sup>	10.24 <sup>20</sup>	21.623 <sup>156</sup>	28.46 <sup>121</sup>	41.285 <sup>157</sup>	15.10 <sup>82</sup>	18.91 <sup>37</sup>	63.14 <sup>277</sup>
20.9	51.049 <sup>223</sup>	10.08 <sup>16</sup>	21.815 <sup>192</sup>	29.65 <sup>119</sup>	41.476 <sup>191</sup>	15.91 <sup>81</sup>	19.39 <sup>48</sup>	60.51 <sup>268</sup>
30.9	51.303 <sup>254</sup>	9.94 <sup>14</sup>	22.035 <sup>220</sup>	30.74 <sup>109</sup>	41.698 <sup>222</sup>	16.67 <sup>76</sup>	19.98 <sup>59</sup>	58.09 <sup>242</sup>
Feb. 9.9	51.581 <sup>278</sup>	9.81 <sup>13</sup>	22.281 <sup>246</sup>	31.70 <sup>96</sup>	41.944 <sup>246</sup>	17.32 <sup>65</sup>	20.66 <sup>68</sup>	55.94 <sup>215</sup>
	302	14	263	76	267	51	74	185
19.9	51.883	9.67	22.544	32.46	42.211	17.83	21.40	54.09
Mar. 1.8	52.198 <sup>315</sup>	9.50 <sup>17</sup>	22.822 <sup>278</sup>	32.98 <sup>52</sup>	42.492 <sup>281</sup>	18.15 <sup>32</sup>	22.20 <sup>80</sup>	52.59 <sup>150</sup>
11.8	52.523 <sup>325</sup>	9.30 <sup>20</sup>	23.110 <sup>288</sup>	33.25 <sup>27</sup>	42.783 <sup>291</sup>	18.27 <sup>12</sup>	23.04 <sup>84</sup>	51.46 <sup>113</sup>
21.8	52.854 <sup>331</sup>	9.05 <sup>25</sup>	23.403 <sup>293</sup>	33.22 <sup>3</sup>	43.081 <sup>298</sup>	18.16 <sup>11</sup>	23.91 <sup>87</sup>	50.70 <sup>76</sup>
31.7	53.186 <sup>332</sup>	8.76 <sup>29</sup>	23.700 <sup>297</sup>	32.91 <sup>31</sup>	43.382 <sup>301</sup>	17.83 <sup>33</sup>	24.78 <sup>87</sup>	50.33 <sup>37</sup>
	330	33	295	61	300	54	86	0
Apr. 10.7	53.516	8.43	23.995	32.30	43.682	17.29	25.64	50.33
20.7	53.840 <sup>324</sup>	8.08 <sup>35</sup>	24.285 <sup>290</sup>	31.47 <sup>83</sup>	43.978 <sup>296</sup>	16.55 <sup>74</sup>	26.49 <sup>85</sup>	50.73 <sup>40</sup>
30.7	54.153 <sup>313</sup>	7.73 <sup>35</sup>	24.564 <sup>279</sup>	30.40 <sup>107</sup>	44.265 <sup>287</sup>	15.66 <sup>89</sup>	27.31 <sup>82</sup>	51.50 <sup>77</sup>
May 10.6	54.449 <sup>296</sup>	7.40 <sup>33</sup>	24.828 <sup>264</sup>	29.18 <sup>122</sup>	44.538 <sup>273</sup>	14.65 <sup>101</sup>	28.07 <sup>76</sup>	52.63 <sup>113</sup>
20.6	54.725 <sup>276</sup>	7.10 <sup>30</sup>	25.073 <sup>245</sup>	27.83 <sup>135</sup>	44.792 <sup>254</sup>	13.55 <sup>110</sup>	28.77 <sup>70</sup>	54.08 <sup>145</sup>
	250	24	220	143	231	114	61	175
30.6	54.975	6.86	25.293	26.40	45.023	12.41	29.38	55.83
June 9.6	55.193 <sup>218</sup>	6.68 <sup>18</sup>	25.485 <sup>192</sup>	24.95 <sup>145</sup>	45.225 <sup>202</sup>	11.28 <sup>113</sup>	29.90 <sup>52</sup>	57.83 <sup>200</sup>
19.5	55.375 <sup>182</sup>	6.59 <sup>9</sup>	25.645 <sup>160</sup>	23.51 <sup>144</sup>	45.394 <sup>169</sup>	10.17 <sup>111</sup>	30.32 <sup>42</sup>	60.04 <sup>221</sup>
29.5	55.518 <sup>143</sup>	6.58 <sup>1</sup>	25.767 <sup>122</sup>	22.12 <sup>139</sup>	45.526 <sup>132</sup>	9.13 <sup>104</sup>	30.63 <sup>31</sup>	62.39 <sup>235</sup>
July 9.5	55.617 <sup>99</sup>	6.66 <sup>8</sup>	25.850 <sup>83</sup>	20.86 <sup>126</sup>	45.619 <sup>93</sup>	8.18 <sup>95</sup>	30.81 <sup>18</sup>	64.82 <sup>243</sup>
	51	13	41	119	50	85	6	243
19.4	55.668	6.79	25.891	19.67	45.669	7.33	30.87	67.25
29.4	55.672 <sup>4</sup>	6.98 <sup>19</sup>	25.890 <sup>1</sup>	18.62 <sup>105</sup>	45.676 <sup>7</sup>	6.61 <sup>72</sup>	30.81 <sup>6</sup>	69.62 <sup>237</sup>
Aug. 8.4	55.632 <sup>40</sup>	7.20 <sup>22</sup>	25.847 <sup>43</sup>	17.73 <sup>89</sup>	45.641 <sup>35</sup>	6.01 <sup>60</sup>	30.62 <sup>19</sup>	71.82 <sup>220</sup>
18.4	55.549 <sup>83</sup>	7.43 <sup>23</sup>	25.768 <sup>79</sup>	16.98 <sup>75</sup>	45.567 <sup>74</sup>	5.52 <sup>49</sup>	30.30 <sup>32</sup>	73.80 <sup>196</sup>
28.3	55.428 <sup>121</sup>	7.65 <sup>22</sup>	25.654 <sup>114</sup>	16.40 <sup>58</sup>	45.458 <sup>109</sup>	5.15 <sup>37</sup>	29.90 <sup>40</sup>	75.47 <sup>167</sup>
	151	17	141	44	136	25	49	120
Sept. 7.3	55.277	7.82	25.513	15.96	45.322	4.90	29.41	76.76
17.3	55.102 <sup>175</sup>	7.94 <sup>12</sup>	25.353 <sup>160</sup>	15.69 <sup>27</sup>	45.163 <sup>159</sup>	4.74 <sup>16</sup>	28.86 <sup>55</sup>	77.61 <sup>85</sup>
27.3	54.917 <sup>185</sup>	7.99 <sup>5</sup>	25.183 <sup>170</sup>	15.56 <sup>13</sup>	44.993 <sup>170</sup>	4.68 <sup>6</sup>	28.27 <sup>59</sup>	77.99 <sup>38</sup>
Oct. 7.2	54.731 <sup>186</sup>	7.95 <sup>4</sup>	25.010 <sup>173</sup>	15.60 <sup>4</sup>	44.821 <sup>172</sup>	4.71 <sup>3</sup>	27.66 <sup>61</sup>	77.87 <sup>12</sup>
17.2	54.555 <sup>176</sup>	7.82 <sup>13</sup>	24.847 <sup>163</sup>	15.78 <sup>18</sup>	44.658 <sup>163</sup>	4.82 <sup>11</sup>	27.08 <sup>58</sup>	77.23 <sup>64</sup>
	154	22	146	34	147	22	54	114
27.2	54.401	7.60	24.701	16.12	44.511	5.04	26.54	76.09
Nov. 6.1	54.277 <sup>124</sup>	7.33 <sup>27</sup>	24.583 <sup>118</sup>	16.63 <sup>51</sup>	44.392 <sup>119</sup>	5.35 <sup>31</sup>	26.07 <sup>47</sup>	74.48 <sup>161</sup>
16.1	54.192 <sup>85</sup>	7.01 <sup>32</sup>	24.499 <sup>84</sup>	17.28 <sup>65</sup>	44.307 <sup>85</sup>	5.76 <sup>41</sup>	25.70 <sup>37</sup>	72.47 <sup>201</sup>
26.1	54.152 <sup>40</sup>	6.67 <sup>34</sup>	24.457 <sup>42</sup>	18.09 <sup>81</sup>	44.261 <sup>46</sup>	6.27 <sup>51</sup>	25.46 <sup>24</sup>	70.13 <sup>234</sup>
Dec. 6.1	54.162 <sup>10</sup>	6.34 <sup>33</sup>	24.457 <sup>0</sup>	19.03 <sup>94</sup>	44.260 <sup>1</sup>	6.88 <sup>61</sup>	25.33 <sup>13</sup>	67.51 <sup>262</sup>
	60	32	43	107	43	71	1	277
16.0	54.222	6.02	24.500	20.10	44.303	7.59	25.34	64.74
26.0	54.331 <sup>109</sup>	5.74 <sup>28</sup>	24.588 <sup>88</sup>	21.25 <sup>115</sup>	44.390 <sup>87</sup>	8.36 <sup>77</sup>	25.48 <sup>14</sup>	61.89 <sup>285</sup>
36.0	54.486 <sup>155</sup>	5.51 <sup>23</sup>	24.717 <sup>129</sup>	22.46 <sup>121</sup>	44.520 <sup>130</sup>	9.17 <sup>81</sup>	25.77 <sup>29</sup>	59.06 <sup>283</sup>
Mean Place	50.911	7.64	21.795	23.78	41.420	11.05	20.434	64.20
Sec $\delta$ , Tan $\delta$	1.108	-0.476	1.001	-0.036	1.011	-0.146	3.152	-2.989
$D\psi\alpha$ , $D\omega\alpha$	+0.07	0.00	+0.06	0.00	+0.06	0.00	+0.14	+0.93
$D\psi\delta$ , $D\omega\delta$	0.0	-1.0	0.0	-1.0	+0.1	-1.0	+0.1	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Lyrae. (Vega.) Mag. 0.1		$\gamma$ Aquilae. Mag. 4.7		$\phi$ Sagittarii. Mag. 3.3		110 Herculis. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 34	° ' +38 42	h m 18 37	° ' - 9 7	h m 18 40	° ' -27 4	h m 18 42	° ' +20 27
	s "	"	s "	"	s "	"	s "	"
Jan. 1.0	6.597	17.40	43.529	61.76	27.989	40.73	4.710	54.69
11.0	6.713	14.34	43.680	62.51	28.157	40.34	4.832	52.33
20.9	6.879	11.36	43.865	63.24	28.365	39.98	4.993	50.02
30.9	7.088	8.59	44.082	63.90	28.605	39.64	5.187	47.88
Feb. 9.9	7.336	6.14	44.323	64.48	28.875	39.30	5.413	45.98
19.9	7.616	4.09	44.586	64.92	29.166	38.96	5.664	44.40
Mar. 1.8	7.922	2.54	44.864	65.17	29.476	38.60	5.933	43.22
11.8	8.246	1.54	45.154	65.23	29.798	38.22	6.218	42.48
21.8	8.582	1.14	45.451	65.07	30.130	37.80	6.514	42.21
31.8	8.924	1.34	45.753	64.71	30.466	37.35	6.815	42.43
Apr. 10.7	9.263	2.13	46.055	64.14	30.802	36.89	7.116	43.13
20.7	9.594	3.47	46.353	63.38	31.135	36.42	7.413	44.28
30.7	9.909	5.31	46.644	62.47	31.461	35.97	7.701	45.82
May 10.6	10.201	7.59	46.922	61.45	31.771	35.56	7.974	47.69
20.6	10.464	10.22	47.181	60.35	32.063	35.20	8.225	49.85
30.6	10.693	13.11	47.418	59.22	32.331	34.92	8.452	52.21
June 9.6	10.883	16.19	47.627	58.09	32.569	34.74	8.646	54.69
19.5	11.027	19.35	47.804	56.99	32.770	34.65	8.805	57.23
29.5	11.124	22.52	47.943	55.97	32.931	34.67	8.925	59.76
July 9.5	11.170	25.61	48.043	55.04	33.047	34.78	9.003	62.21
19.5	11.166	28.55	48.100	54.22	33.116	34.99	9.037	64.53
29.4	11.112	31.29	48.114	53.52	33.138	35.26	9.027	66.66
Aug. 8.4	11.010	33.75	48.085	52.93	33.112	35.57	8.974	68.58
18.4	10.863	35.88	48.016	52.47	33.041	35.91	8.882	70.23
28.3	10.679	37.66	47.911	52.12	32.930	36.24	8.753	71.60
Sept. 7.3	10.461	39.03	47.778	51.88	32.786	36.52	8.595	72.65
17.3	10.221	39.98	47.623	51.73	32.615	36.74	8.415	73.37
27.3	9.967	40.48	47.453	51.67	32.430	36.88	8.221	73.76
Oct. 7.2	9.709	40.52	47.281	51.70	32.241	36.92	8.023	73.81
17.2	9.458	40.09	47.116	51.80	32.059	36.85	7.831	73.49
27.2	9.225	39.20	46.967	51.99	31.895	36.68	7.654	72.83
Nov. 6.2	9.020	37.85	46.845	52.27	31.758	36.41	7.501	71.82
16.1	8.851	36.06	46.755	52.64	31.659	36.07	7.381	70.48
26.1	8.725	33.88	46.705	53.10	31.604	35.68	7.299	68.84
Dec. 6.1	8.649	31.37	46.698	53.64	31.596	35.26	7.259	66.94
16.0	8.625	28.59	46.735	54.26	31.638	34.83	7.263	64.81
26.0	8.654	25.62	46.816	54.96	31.729	34.40	7.313	62.53
36.0	8.737	22.56	46.940	55.70	31.866	34.00	7.405	60.18
Mean Place	7.695	20.61	43.817	58.66	28.264	37.80	5.321	57.52
Sec $\delta$ , Tan $\delta$	1.281	+0.801	1.013	-0.161	1.123	-0.511	1.067	+0.373
$D\phi\alpha$ , $D_\omega\alpha$	+0.04	-0.01	+0.07	0.00	+0.07	+0.01	+0.05	0.00
$D\phi\delta$ , $D_\omega\delta$	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	6 Aquilæ. Mag. 4.5		$\lambda$ Pavonis. Mag. 4.4		$\beta$ Lyre. Var. 3.4-4.1		50 Draconis. Mag. 5.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 42	° ' " - 4 50	h m 18 44	° ' " - 62 16	h m 18 47	° ' " + 33 15	h m 18 48	° ' " + 75 19
	s	"	s	"	s	"	s	"
Jan. 1.0	45.920	18.58	30.77	65.56	0.001	53.87	57.44	70.27
11.0	46.062 <sup>142</sup>	19.56 <sup>98</sup>	31.02 <sup>25</sup>	63.13 <sup>243</sup>	0.107 <sup>106</sup>	51.01 <sup>286</sup>	57.44 <sup>0</sup>	66.83 <sup>344</sup>
21.0	46.239 <sup>177</sup>	20.53 <sup>97</sup>	31.36 <sup>34</sup>	60.81 <sup>232</sup>	0.258 <sup>151</sup>	48.20 <sup>281</sup>	57.61 <sup>17</sup>	63.42 <sup>341</sup>
30.9	46.447 <sup>208</sup>	21.42 <sup>89</sup>	31.76 <sup>40</sup>	58.65 <sup>216</sup>	0.449 <sup>191</sup>	45.58 <sup>262</sup>	57.95 <sup>34</sup>	60.19 <sup>323</sup>
Feb. 9.9	46.680 <sup>233</sup>	22.18 <sup>76</sup>	32.22 <sup>46</sup>	56.68 <sup>197</sup>	0.677 <sup>228</sup>	43.23 <sup>235</sup>	58.43 <sup>48</sup>	57.26 <sup>293</sup>
	255	60	51	172	259	197	61	253
19.9	46.935	22.78	32.73	54.96	0.936	41.26	59.04	54.73
Mar. 1.8	47.206 <sup>271</sup>	23.17 <sup>39</sup>	33.29 <sup>56</sup>	53.49 <sup>147</sup>	1.220 <sup>284</sup>	39.74 <sup>152</sup>	59.76 <sup>72</sup>	52.70 <sup>203</sup>
11.8	47.490 <sup>284</sup>	23.31 <sup>14</sup>	33.87 <sup>58</sup>	52.32 <sup>117</sup>	1.524 <sup>304</sup>	38.73 <sup>101</sup>	59.76 <sup>80</sup>	51.26 <sup>144</sup>
21.8	47.782 <sup>292</sup>	23.21 <sup>10</sup>	34.47 <sup>60</sup>	51.44 <sup>88</sup>	1.840 <sup>316</sup>	38.29 <sup>44</sup>	61.43 <sup>87</sup>	50.45 <sup>81</sup>
31.8	48.079 <sup>297</sup>	22.84 <sup>37</sup>	35.08 <sup>61</sup>	50.89 <sup>55</sup>	2.163 <sup>323</sup>	38.42 <sup>13</sup>	62.32 <sup>89</sup>	50.30 <sup>15</sup>
	298	62	61	24	325	68	89	52
Apr. 10.7	48.377	22.22	35.69	50.65	2.488	39.10	63.21	50.82
20.7	48.673 <sup>296</sup>	21.38 <sup>84</sup>	36.29 <sup>60</sup>	50.73 <sup>8</sup>	2.808 <sup>320</sup>	40.32 <sup>122</sup>	64.05 <sup>84</sup>	51.96 <sup>114</sup>
30.7	48.961 <sup>288</sup>	20.35 <sup>103</sup>	36.87 <sup>58</sup>	51.13 <sup>40</sup>	3.115 <sup>307</sup>	42.02 <sup>170</sup>	64.85 <sup>80</sup>	53.69 <sup>173</sup>
May 10.7	49.237 <sup>276</sup>	19.16 <sup>119</sup>	37.42 <sup>55</sup>	51.85 <sup>72</sup>	3.406 <sup>291</sup>	44.15 <sup>213</sup>	65.56 <sup>71</sup>	55.93 <sup>224</sup>
20.6	49.495 <sup>258</sup>	17.87 <sup>129</sup>	37.93 <sup>51</sup>	52.85 <sup>100</sup>	3.671 <sup>265</sup>	46.62 <sup>247</sup>	66.16 <sup>60</sup>	58.62 <sup>269</sup>
	236	135	46	130	237	272	49	305
30.6	49.731	16.52	38.39	54.15	3.908	49.34	66.65	61.67
June 9.6	49.940 <sup>209</sup>	15.16 <sup>136</sup>	38.80 <sup>41</sup>	55.69 <sup>154</sup>	4.108 <sup>200</sup>	52.25 <sup>291</sup>	67.00 <sup>35</sup>	64.97 <sup>330</sup>
19.5	50.116 <sup>176</sup>	13.81 <sup>135</sup>	39.14 <sup>34</sup>	57.43 <sup>174</sup>	4.268 <sup>160</sup>	55.26 <sup>301</sup>	67.21 <sup>21</sup>	68.43 <sup>346</sup>
29.5	50.257 <sup>141</sup>	12.53 <sup>128</sup>	39.39 <sup>25</sup>	59.33 <sup>190</sup>	4.384 <sup>116</sup>	58.29 <sup>303</sup>	67.28 <sup>7</sup>	71.97 <sup>354</sup>
July 9.5	50.357 <sup>100</sup>	11.35 <sup>118</sup>	39.57 <sup>18</sup>	61.34 <sup>201</sup>	4.453 <sup>69</sup>	61.25 <sup>296</sup>	67.18 <sup>10</sup>	75.48 <sup>351</sup>
	58	108	8	205	21	284	23	341
19.5	50.415 <sup>16</sup>	10.27 <sup>94</sup>	39.65 <sup>0</sup>	63.39 <sup>204</sup>	4.474 <sup>28</sup>	64.09 <sup>264</sup>	66.95 <sup>37</sup>	78.89 <sup>323</sup>
29.4	50.431 <sup>26</sup>	9.33 <sup>80</sup>	39.65 <sup>9</sup>	65.43 <sup>194</sup>	4.446 <sup>74</sup>	66.73 <sup>240</sup>	66.58 <sup>50</sup>	82.12 <sup>297</sup>
Aug. 8.4	50.405 <sup>67</sup>	8.53 <sup>65</sup>	39.56 <sup>9</sup>	67.37 <sup>177</sup>	4.372 <sup>118</sup>	69.13 <sup>209</sup>	66.08 <sup>63</sup>	85.09 <sup>266</sup>
18.4	50.338 <sup>102</sup>	7.88 <sup>52</sup>	39.39 <sup>24</sup>	69.14 <sup>153</sup>	4.254 <sup>157</sup>	71.22 <sup>176</sup>	65.45 <sup>73</sup>	87.75 <sup>228</sup>
28.4	50.236 <sup>132</sup>	7.36 <sup>37</sup>	39.15 <sup>30</sup>	70.67 <sup>122</sup>	4.097 <sup>188</sup>	72.98 <sup>139</sup>	64.72 <sup>82</sup>	90.03 <sup>187</sup>
Sept. 7.3	50.104	6.99	38.85	71.89	3.909	74.37	63.90	91.90
17.3	49.951 <sup>153</sup>	6.76 <sup>23</sup>	38.49 <sup>36</sup>	72.76 <sup>87</sup>	3.695 <sup>214</sup>	75.36 <sup>99</sup>	63.02 <sup>88</sup>	93.31 <sup>141</sup>
27.3	49.783 <sup>168</sup>	6.66 <sup>10</sup>	38.10 <sup>39</sup>	73.24 <sup>48</sup>	3.467 <sup>228</sup>	75.94 <sup>58</sup>	62.10 <sup>92</sup>	94.21 <sup>90</sup>
Oct. 7.2	49.610 <sup>173</sup>	6.68 <sup>2</sup>	37.70 <sup>40</sup>	73.27 <sup>3</sup>	3.233 <sup>234</sup>	76.08 <sup>14</sup>	61.15 <sup>95</sup>	94.60 <sup>39</sup>
17.2	49.445 <sup>165</sup>	6.82 <sup>1</sup>	37.32 <sup>38</sup>	72.86 <sup>41</sup>	3.004 <sup>229</sup>	75.79 <sup>20</sup>	60.20 <sup>95</sup>	94.46 <sup>14</sup>
	151	28	35	85	214	73	91	68
27.2	49.294 <sup>125</sup>	7.10 <sup>40</sup>	36.97 <sup>31</sup>	72.01 <sup>127</sup>	2.790 <sup>190</sup>	75.06 <sup>117</sup>	59.29 <sup>86</sup>	93.78 <sup>121</sup>
Nov. 6.2	49.169 <sup>94</sup>	7.50 <sup>52</sup>	36.66 <sup>25</sup>	70.74 <sup>163</sup>	2.600 <sup>157</sup>	73.89 <sup>157</sup>	58.43 <sup>79</sup>	92.57 <sup>173</sup>
16.1	49.075 <sup>55</sup>	8.02 <sup>64</sup>	36.41 <sup>17</sup>	69.11 <sup>194</sup>	2.443 <sup>117</sup>	72.32 <sup>196</sup>	57.64 <sup>69</sup>	90.84 <sup>221</sup>
26.1	49.020 <sup>14</sup>	8.66 <sup>76</sup>	36.24 <sup>8</sup>	67.17 <sup>219</sup>	2.326 <sup>73</sup>	70.36 <sup>228</sup>	56.95 <sup>55</sup>	88.63 <sup>264</sup>
Dec. 6.1	49.006 <sup>30</sup>	9.42 <sup>86</sup>	36.16 <sup>1</sup>	64.98 <sup>235</sup>	2.253 <sup>24</sup>	68.08 <sup>256</sup>	56.40 <sup>42</sup>	85.99 <sup>300</sup>
16.1	49.036	10.28	36.17	62.63	2.229	65.52	55.98	82.99
26.0	49.110 <sup>74</sup>	11.21 <sup>93</sup>	36.28 <sup>11</sup>	60.19 <sup>244</sup>	2.254 <sup>25</sup>	62.78 <sup>274</sup>	55.71 <sup>27</sup>	79.74 <sup>325</sup>
36.0	49.224 <sup>114</sup>	12.17 <sup>96</sup>	36.48 <sup>20</sup>	57.73 <sup>246</sup>	2.328 <sup>74</sup>	59.93 <sup>285</sup>	55.62 <sup>9</sup>	76.33 <sup>341</sup>
Mean Place	46.231	15.57	31.787	63.04	0.919	56.11	63.584	71.11
Sec $\delta$ , Tan $\delta$	1.004	-0.085	2.150	-1.903	1.196	+0.656	3.950	+3.821
$D\psi\alpha$ , $D_\omega\alpha$	+0.06	0.00	+0.11	+0.02	+0.04	-0.01	-0.04	-0.05
$D\psi\delta$ , $D_\omega\delta$	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0

## APPARENT PLACES OF STARS, 1917.

**FOR THE UPPER TRANSIT AT WASHINGTON.**

Washington Mean Time.	♈ Draconis. Mag. 4.8		♐ Sagittarii. Mag. 2.1		♏ Serpentis <i>pr.</i> Mag. 4.5		♌ Lyrae. Var. 4.0-4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 18 49	° ' " +59 16	h m 18 50	° ' " -26 23	h m 18 52	° ' " + 4 5	h m 18 52	° ' " +43 49
	s "	"	s "	"	s "	"	s "	"
Jan. 1.0	56.294	70.53	6.845	66.68	5.201	38.14	47.268	68.76
11.0	56.361 <sup>67</sup>	67.08 <sup>345</sup>	7.001 <sup>156</sup>	66.31 <sup>37</sup>	5.327 <sup>126</sup>	36.66 <sup>148</sup>	47.356 <sup>88</sup>	65.59 <sup>317</sup>
21.0	56.508 <sup>147</sup>	63.69 <sup>339</sup>	7.197 <sup>196</sup>	65.94 <sup>37</sup>	5.488 <sup>161</sup>	35.21 <sup>145</sup>	47.497 <sup>141</sup>	62.48 <sup>311</sup>
30.9	56.729 <sup>221</sup>	60.48 <sup>321</sup>	7.426 <sup>229</sup>	65.59 <sup>35</sup>	5.680 <sup>192</sup>	33.87 <sup>134</sup>	47.688 <sup>191</sup>	59.54 <sup>294</sup>
Feb. 9.9	57.019 <sup>290</sup>	57.58 <sup>290</sup>	7.686 <sup>260</sup>	65.22 <sup>37</sup>	5.900 <sup>220</sup>	32.70 <sup>117</sup>	47.925 <sup>237</sup>	56.89 <sup>265</sup>
	349	248	282	37	242	96	275	226
19.9	57.368	55.10	7.968	64.85	6.142	31.74	48.200	54.63
Mar. 1.8	57.767 <sup>399</sup>	53.13 <sup>197</sup>	8.269 <sup>301</sup>	64.44 <sup>41</sup>	6.403 <sup>261</sup>	31.07 <sup>67</sup>	48.508 <sup>308</sup>	52.86 <sup>177</sup>
11.8	58.205 <sup>438</sup>	51.76 <sup>137</sup>	8.585 <sup>316</sup>	63.99 <sup>45</sup>	6.678 <sup>275</sup>	30.72 <sup>35</sup>	48.840 <sup>332</sup>	51.64 <sup>122</sup>
21.8	58.668 <sup>463</sup>	51.02 <sup>74</sup>	8.911 <sup>326</sup>	63.50 <sup>49</sup>	6.964 <sup>286</sup>	30.70 <sup>2</sup>	49.191 <sup>351</sup>	51.02 <sup>62</sup>
31.8	59.144 <sup>476</sup>	50.95 <sup>7</sup>	9.244 <sup>333</sup>	62.97 <sup>53</sup>	7.256 <sup>292</sup>	31.03 <sup>33</sup>	49.551 <sup>360</sup>	51.03 <sup>62</sup>
	477	58	335	55	295	67	362	1
Apr. 10.7	59.621	51.53	9.579	62.42	7.551	31.70	49.913	51.65
20.7	60.086 <sup>465</sup>	52.75 <sup>122</sup>	9.912 <sup>333</sup>	61.87 <sup>55</sup>	7.844 <sup>293</sup>	32.67 <sup>97</sup>	50.269 <sup>356</sup>	52.85 <sup>120</sup>
30.7	60.525 <sup>439</sup>	54.54 <sup>179</sup>	10.239 <sup>327</sup>	61.32 <sup>55</sup>	8.131 <sup>287</sup>	33.92 <sup>125</sup>	50.612 <sup>343</sup>	54.59 <sup>174</sup>
May 10.7	60.928 <sup>403</sup>	56.85 <sup>231</sup>	10.554 <sup>315</sup>	60.81 <sup>51</sup>	8.407 <sup>276</sup>	35.39 <sup>147</sup>	50.933 <sup>321</sup>	56.82 <sup>223</sup>
20.6	61.286 <sup>358</sup>	59.60 <sup>275</sup>	10.851 <sup>297</sup>	60.37 <sup>44</sup>	8.665 <sup>258</sup>	37.04 <sup>165</sup>	51.224 <sup>291</sup>	59.42 <sup>260</sup>
	302	309	274	38	238	176	255	294
30.6	61.588	62.69	11.125	59.99	8.903	38.80	51.479	62.36
June 9.6	61.827 <sup>239</sup>	66.02 <sup>333</sup>	11.369 <sup>244</sup>	59.72 <sup>27</sup>	9.112 <sup>209</sup>	40.62 <sup>182</sup>	51.693 <sup>214</sup>	65.51 <sup>311</sup>
19.5	61.998 <sup>171</sup>	69.52 <sup>350</sup>	11.578 <sup>209</sup>	59.55 <sup>17</sup>	9.290 <sup>178</sup>	42.45 <sup>183</sup>	51.859 <sup>166</sup>	68.80 <sup>329</sup>
29.5	62.096 <sup>98</sup>	73.07 <sup>355</sup>	11.747 <sup>169</sup>	59.49 <sup>6</sup>	9.432 <sup>142</sup>	44.24 <sup>179</sup>	51.975 <sup>116</sup>	72.12 <sup>332</sup>
July 9.5	62.119 <sup>23</sup>	76.58 <sup>351</sup>	11.872 <sup>125</sup>	59.55 <sup>6</sup>	9.533 <sup>101</sup>	45.95 <sup>171</sup>	52.036 <sup>61</sup>	75.41 <sup>329</sup>
	53	341	79	15	60	157	6	317
19.5	62.066	79.99	11.951	59.70	9.593	47.52	52.042	78.58
29.4	61.940 <sup>126</sup>	83.20 <sup>321</sup>	11.981 <sup>30</sup>	59.93 <sup>23</sup>	9.610 <sup>17</sup>	48.96 <sup>144</sup>	51.993 <sup>49</sup>	81.55 <sup>297</sup>
Aug. 8.4	61.743 <sup>197</sup>	86.15 <sup>295</sup>	11.963 <sup>18</sup>	60.22 <sup>29</sup>	9.585 <sup>25</sup>	50.21 <sup>125</sup>	51.892 <sup>101</sup>	84.27 <sup>272</sup>
18.4	61.483 <sup>260</sup>	88.76 <sup>261</sup>	11.899 <sup>64</sup>	60.55 <sup>33</sup>	9.519 <sup>66</sup>	51.27 <sup>106</sup>	51.742 <sup>150</sup>	86.68 <sup>241</sup>
28.4	61.166 <sup>317</sup>	91.00 <sup>224</sup>	11.795 <sup>104</sup>	60.88 <sup>33</sup>	9.418 <sup>101</sup>	52.14 <sup>87</sup>	51.548 <sup>194</sup>	88.72 <sup>204</sup>
	364	181	138	30	132	66	230	165
Sept. 7.3	60.802	92.81	11.657	61.18	9.286	52.80	51.318	90.37
17.3	60.401 <sup>401</sup>	94.15 <sup>134</sup>	11.491 <sup>166</sup>	61.44 <sup>26</sup>	9.132 <sup>154</sup>	53.25 <sup>45</sup>	51.059 <sup>259</sup>	91.58 <sup>121</sup>
27.3	59.978 <sup>423</sup>	95.00 <sup>85</sup>	11.308 <sup>183</sup>	61.62 <sup>18</sup>	8.962 <sup>170</sup>	53.48 <sup>23</sup>	50.782 <sup>277</sup>	92.33 <sup>77</sup>
Oct. 7.2	59.543 <sup>435</sup>	95.33 <sup>33</sup>	11.120 <sup>188</sup>	61.71 <sup>9</sup>	8.787 <sup>175</sup>	53.51 <sup>3</sup>	50.498 <sup>284</sup>	92.60 <sup>27</sup>
17.2	59.112 <sup>431</sup>	95.12 <sup>21</sup>	10.936 <sup>184</sup>	61.70 <sup>1</sup>	8.617 <sup>170</sup>	53.32 <sup>19</sup>	50.217 <sup>281</sup>	92.38 <sup>22</sup>
	414	75	166	11	156	39	266	71
27.2	58.698	94.37	10.770	61.59	8.461	52.93	49.951	91.67
Nov. 6.2	58.317 <sup>381</sup>	93.09 <sup>128</sup>	10.630 <sup>140</sup>	61.39 <sup>20</sup>	8.327 <sup>134</sup>	52.34 <sup>59</sup>	49.709 <sup>242</sup>	90.47 <sup>120</sup>
16.1	57.980 <sup>337</sup>	91.30 <sup>179</sup>	10.526 <sup>104</sup>	61.10 <sup>29</sup>	8.224 <sup>103</sup>	51.53 <sup>81</sup>	49.502 <sup>207</sup>	88.80 <sup>167</sup>
26.1	57.699 <sup>281</sup>	89.04 <sup>226</sup>	10.463 <sup>63</sup>	60.76 <sup>34</sup>	8.156 <sup>68</sup>	50.54 <sup>99</sup>	49.338 <sup>164</sup>	86.70 <sup>210</sup>
Dec. 6.1	57.483 <sup>216</sup>	86.36 <sup>268</sup>	10.446 <sup>17</sup>	60.38 <sup>38</sup>	8.129 <sup>27</sup>	49.37 <sup>117</sup>	49.223 <sup>115</sup>	84.22 <sup>248</sup>
	143	303	32	39	15	131	61	278
16.1	57.340	83.33	10.478	59.99	8.144	48.06	49.162	81.44
26.0	57.276 <sup>64</sup>	80.06 <sup>327</sup>	10.558 <sup>80</sup>	59.60 <sup>39</sup>	8.202 <sup>58</sup>	46.65 <sup>141</sup>	49.156 <sup>6</sup>	78.42 <sup>302</sup>
36.0	57.292 <sup>16</sup>	76.65 <sup>341</sup>	10.684 <sup>126</sup>	59.21 <sup>39</sup>	8.299 <sup>97</sup>	45.18 <sup>147</sup>	49.208 <sup>52</sup>	75.27 <sup>315</sup>
Mean Place	58.730	71.75	7.114	63.66	5.582	40.76	48.588	70.20
Sec $\delta$ , Tan $\delta$	1.958	+1.683	1.116	-0.496	1.003	+0.072	1.386	+0.960
$D\phi a$ , $D_{\omega} a$	+0.02	-0.02	+0.07	+0.01	+0.06	0.00	+0.04	-0.01
$D\phi \delta$ , $D_{\omega} \delta$	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Lyrae. Mag. 3.3			$\epsilon$ Aquilæ. Mag. 4.2			$\zeta$ Sagittarii. Mag. 2.7			$\zeta$ Aquilæ. Mag. 3.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "
	18 55		+32 34	18 55		+14 57	18 57		-29 59	19 1		+13 44
Jan. 1.0	49.401		28.17	50.786		14.57	19.607		63.39	35.204		19.23
11.0	49.498	97	25.35 282	50.900	114	12.52 205	19.760	153	62.76 63	35.312	108	17.25 198
21.0	49.639	141	22.58 277	51.050	150	10.51 201	19.953	193	62.14 62	35.457	145	15.32 193
30.9	49.821	182	19.98 260	51.233	183	8.63 188	20.182	229	61.53 61	35.636	179	13.50 182
Feb. 9.9	50.040	219	17.63 235	51.447	214	6.97 166	20.443	261	60.94 59	35.845	209	11.88 162
		251	15.64 199		237	5.57 140		285	60.34 60		233	11.88 135
19.9	50.291		15.64	51.684		5.57	20.728		60.34	36.078		10.53
Mar. 1.8	50.567	276	14.09 155	51.943	259	4.54 103	21.034	306	59.74 60	36.333	255	9.53 100
11.8	50.865	298	13.05 104	52.218	275	3.91 63	21.356	322	59.13 61	36.605	272	8.92 61
21.8	51.177	312	12.57 48	52.505	287	3.70 21	21.690	334	58.52 61	36.889	284	8.72 20
31.8	51.497	320	12.64 7	52.799	294	3.92 22	22.033	343	57.91 61	37.182	293	8.95 23
		324	13.27 63		297	4.58 66		345	57.32 59		297	9.60 65
Apr. 10.7	51.821		13.27	53.096		4.58	22.378		57.32	37.479		9.60
20.7	52.142	321	14.43 116	53.391	295	5.64 106	22.722	344	56.76 56	37.775	296	10.65 105
30.7	52.452	310	16.07 164	53.680	289	7.06 142	23.061	339	56.24 52	38.066	291	12.04 139
May 10.7	52.747	295	18.14 207	53.957	277	8.80 174	23.389	328	55.79 45	38.346	280	13.75 171
20.6	53.020	273	20.56 242	54.216	259	10.79 199	23.698	309	55.43 36	38.608	262	15.70 195
		243	23.26 270		236	12.97 218		288	55.18 25		242	17.84 214
30.6	53.263		23.26	54.452		12.97	23.986		55.18	38.850		17.84
June 9.6	53.471	208	26.14 288	54.659	207	15.26 229	24.243	257	55.04 14	39.063	213	20.09 225
19.5	53.641	170	29.13 299	54.834	175	17.60 234	24.465	222	55.03 1	39.243	180	22.38 229
29.5	53.767	126	32.15 302	54.972	138	19.93 233	24.646	181	55.15 12	39.387	144	24.67 229
July 9.5	53.846	79	35.13 298	55.069	97	22.19 226	24.783	137	55.40 25	39.489	102	26.88 221
		32	37.98 285		53	24.31 212		88	55.74 34		60	28.97 200
19.5	53.878		37.98	55.122		24.31	24.871		55.74	39.549		28.97
29.4	53.861	17	40.64 266	55.132	10	26.28 197	24.910	39	56.16 42	39.565	16	30.90 193
Aug. 8.4	53.797	64	43.07 243	55.098	34	28.04 176	24.897	13	56.64 48	39.538	27	32.62 172
18.4	53.689	108	45.21 214	55.024	74	29.56 152	24.837	60	57.15 51	39.470	68	34.13 151
28.4	53.541	148	47.03 182	54.913	111	30.82 126	24.734	103	57.65 50	39.365	105	35.38 125
		181	48.48 145		140	31.82 100		139	58.10 45		136	36.37 90
Sept. 7.3	53.360		48.48	54.773		31.82	24.595		58.10	39.229		36.37
17.3	53.153	207	49.54 106	54.607	166	32.52 70	24.426	169	58.47 37	39.067	162	37.07 70
27.3	52.930	223	50.19 65	54.427	180	32.93 41	24.239	187	58.73 26	38.891	176	37.49 42
Oct. 7.2	52.700	230	50.42 23	54.240	187	33.03 10	24.045	194	58.87 14	38.707	184	37.61 12
17.2	52.473	227	50.21 21	54.057	183	32.82 21	23.854	191	58.88 1	38.525	182	37.43 18
		213	49.56 65		169	32.31 51		175	58.74 14		168	36.97 46
27.2	52.260		49.56	53.888		32.31	23.679		58.74	38.357		36.97
Nov. 6.2	52.068	192	48.49 107	53.739	149	31.49 82	23.529	150	58.46 28	38.208	149	36.21 76
16.1	51.909	159	47.01 148	53.621	118	30.39 110	23.415	114	58.07 39	38.089	119	35.16 105
26.1	51.787	122	45.15 186	53.537	84	29.02 137	23.343	72	57.59 48	38.005	84	33.86 130
Dec. 6.1	51.709	78	42.95 220	53.495	42	27.41 161	23.316	27	57.03 56	37.959	46	32.33 153
		32	40.46 249		1	25.60 181		25	56.43 60		4	30.59 174
16.1	51.677		40.46	53.494		25.60	23.341		56.43	37.955		30.59
26.0	51.694	17	37.78 268	53.537	43	23.64 196	23.414	73	55.80 63	37.994	39	28.71 188
36.0	51.760	66	34.99 279	53.622	85	21.61 203	23.536	122	55.17 63	38.075	81	26.75 196
Mean Place	50.298		29.74	51.301		16.73	19.884		60.26	35.698		21.13
Sec $\delta$ , Tan $\delta$	1.187		+0.639	1.035		+0.267	1.155		-0.577	1.029		+0.245
$D\psi a$ , $D_\omega a$	+0.04		-0.01	+0.05		0.00	+0.08		+0.01	+0.05		0.00
$D\psi \delta$ , $D_\omega \delta$	+0.1		-1.0	+0.1		-1.0	+0.1		-1.0	+0.1		-1.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\lambda$ Aquilæ. Mag. 3.6		$\alpha$ Coronæ Australis. Mag. 4.1		$\epsilon$ Lyræ. Mag. 5.1		$\pi$ Sagittarii. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 1	° ' " - 5 0	h m 19 3	° ' " - 38 1	h m 19 4	° ' " + 35 57	h m 19 4	° ' " - 21 9
	s	"	s	"	s	"	s	"
Jan. 1.0	50.348	30.77	49.226	69.70	19.421	68.82	49.462	26.64
11.0	50.472 <sup>124</sup>	31.69 <sup>92</sup>	49.381 <sup>155</sup>	68.55 <sup>115</sup>	19.503 <sup>82</sup>	65.91 <sup>291</sup>	49.597 <sup>135</sup>	26.54 <sup>10</sup>
21.0	50.631 <sup>159</sup>	32.59 <sup>90</sup>	49.583 <sup>202</sup>	67.42 <sup>113</sup>	19.635 <sup>132</sup>	63.04 <sup>287</sup>	49.770 <sup>173</sup>	26.44 <sup>10</sup>
30.9	50.821 <sup>190</sup>	33.41 <sup>82</sup>	49.825 <sup>242</sup>	66.32 <sup>110</sup>	19.809 <sup>174</sup>	60.31 <sup>273</sup>	49.976 <sup>206</sup>	26.31 <sup>13</sup>
Feb. 9.9	51.039 <sup>218</sup>	34.10 <sup>69</sup>	50.100 <sup>275</sup>	65.26 <sup>106</sup>	20.022 <sup>213</sup>	57.85 <sup>246</sup>	50.211 <sup>235</sup>	26.13 <sup>18</sup>
	240	54	306	100	248	210	261	24
19.9	51.279	34.64	50.406	64.26	20.270	55.75	50.472	25.89
Mar. 1.9	51.540 <sup>261</sup>	34.96 <sup>32</sup>	50.735 <sup>329</sup>	63.31 <sup>95</sup>	20.547 <sup>277</sup>	54.08 <sup>167</sup>	50.751 <sup>279</sup>	25.57 <sup>32</sup>
11.8	51.815 <sup>275</sup>	35.05 <sup>9</sup>	51.084 <sup>349</sup>	62.43 <sup>88</sup>	20.847 <sup>300</sup>	52.92 <sup>116</sup>	51.046 <sup>295</sup>	25.16 <sup>41</sup>
21.8	52.101 <sup>286</sup>	34.88 <sup>17</sup>	51.446 <sup>362</sup>	61.62 <sup>81</sup>	21.164 <sup>317</sup>	52.31 <sup>61</sup>	51.355 <sup>309</sup>	24.66 <sup>50</sup>
31.8	52.396 <sup>295</sup>	34.46 <sup>42</sup>	51.818 <sup>372</sup>	60.90 <sup>72</sup>	21.493 <sup>329</sup>	52.30 <sup>1</sup>	51.672 <sup>317</sup>	24.06 <sup>60</sup>
	290	68	377	64	333	55	322	66
Apr. 10.7	52.695	33.78	52.195	60.26	21.826	52.85	51.994	23.37
20.7	52.994 <sup>299</sup>	32.89 <sup>89</sup>	52.572 <sup>377</sup>	59.74 <sup>52</sup>	22.156 <sup>330</sup>	53.95 <sup>110</sup>	52.316 <sup>322</sup>	22.63 <sup>74</sup>
30.7	53.289 <sup>295</sup>	31.81 <sup>108</sup>	52.944 <sup>372</sup>	59.34 <sup>40</sup>	22.479 <sup>323</sup>	55.57 <sup>162</sup>	52.635 <sup>319</sup>	21.85 <sup>78</sup>
May 10.7	53.574 <sup>285</sup>	30.56 <sup>125</sup>	53.304 <sup>360</sup>	59.09 <sup>25</sup>	22.785 <sup>306</sup>	57.64 <sup>207</sup>	52.943 <sup>308</sup>	21.07 <sup>78</sup>
20.6	53.845 <sup>271</sup>	29.21 <sup>135</sup>	53.645 <sup>341</sup>	58.99 <sup>10</sup>	23.069 <sup>284</sup>	60.08 <sup>244</sup>	53.238 <sup>295</sup>	20.31 <sup>76</sup>
	249	140	317	6	254	274	274	70
30.6	54.094	27.81	53.962	59.05	23.323	62.82	53.512	19.61
June 9.6	54.318 <sup>224</sup>	26.39 <sup>142</sup>	54.248 <sup>286</sup>	59.30 <sup>25</sup>	23.542 <sup>219</sup>	65.78 <sup>296</sup>	53.758 <sup>246</sup>	18.97 <sup>64</sup>
19.6	54.512 <sup>194</sup>	24.99 <sup>140</sup>	54.494 <sup>246</sup>	59.70 <sup>40</sup>	23.720 <sup>178</sup>	68.88 <sup>310</sup>	53.972 <sup>214</sup>	18.43 <sup>54</sup>
29.5	54.669 <sup>157</sup>	23.66 <sup>133</sup>	54.697 <sup>203</sup>	60.25 <sup>55</sup>	23.854 <sup>134</sup>	72.02 <sup>314</sup>	54.149 <sup>177</sup>	18.01 <sup>43</sup>
July 9.5	54.786 <sup>117</sup>	22.43 <sup>123</sup>	54.850 <sup>153</sup>	60.95 <sup>70</sup>	23.940 <sup>86</sup>	75.12 <sup>310</sup>	54.283 <sup>134</sup>	17.71 <sup>30</sup>
	76	110	100	79	36	299	89	18
19.5	54.862	21.33	54.950	61.74	23.976	78.11	54.372	17.53
29.4	54.894 <sup>32</sup>	20.35 <sup>98</sup>	54.994 <sup>44</sup>	62.61 <sup>87</sup>	23.961 <sup>15</sup>	80.94 <sup>283</sup>	54.414 <sup>42</sup>	17.46 <sup>7</sup>
Aug. 8.4	54.882 <sup>12</sup>	19.52 <sup>83</sup>	54.985 <sup>9</sup>	63.52 <sup>91</sup>	23.897 <sup>64</sup>	83.52 <sup>258</sup>	54.410 <sup>4</sup>	17.48 <sup>2</sup>
18.4	54.829 <sup>53</sup>	18.85 <sup>67</sup>	54.922 <sup>63</sup>	64.42 <sup>90</sup>	23.788 <sup>109</sup>	85.82 <sup>230</sup>	54.361 <sup>49</sup>	17.57 <sup>9</sup>
28.4	54.740 <sup>89</sup>	18.33 <sup>52</sup>	54.812 <sup>110</sup>	65.26 <sup>84</sup>	23.636 <sup>152</sup>	87.79 <sup>197</sup>	54.272 <sup>89</sup>	17.72 <sup>15</sup>
	123	38	152	73	186	160	126	18
Sept. 7.3	54.617	17.95	54.660	65.99	23.450	89.39	54.147	17.90
17.3	54.470 <sup>147</sup>	17.71 <sup>24</sup>	54.476 <sup>184</sup>	66.60 <sup>61</sup>	23.236 <sup>214</sup>	90.59 <sup>120</sup>	53.995 <sup>152</sup>	18.08 <sup>18</sup>
27.3	54.306 <sup>164</sup>	17.60 <sup>11</sup>	54.270 <sup>206</sup>	67.02 <sup>42</sup>	23.003 <sup>233</sup>	91.37 <sup>78</sup>	53.823 <sup>172</sup>	18.25 <sup>14</sup>
Oct. 7.3	54.136 <sup>170</sup>	17.62 <sup>2</sup>	54.054 <sup>216</sup>	67.23 <sup>21</sup>	22.761 <sup>242</sup>	91.71 <sup>34</sup>	53.644 <sup>179</sup>	18.39 <sup>17</sup>
17.2	53.969 <sup>167</sup>	17.76 <sup>14</sup>	53.842 <sup>212</sup>	67.23 <sup>0</sup>	22.521 <sup>240</sup>	91.59 <sup>12</sup>	53.467 <sup>177</sup>	18.48 <sup>9</sup>
	155	27	199	24	229	58	163	3
27.2	53.814	18.03	53.643	66.99	22.292	91.01	53.304	18.51
Nov. 6.2	53.680 <sup>134</sup>	18.41 <sup>38</sup>	53.472 <sup>171</sup>	66.55 <sup>44</sup>	22.085 <sup>207</sup>	90.00 <sup>101</sup>	53.163 <sup>141</sup>	18.61 <sup>0</sup>
16.1	53.576 <sup>104</sup>	18.90 <sup>49</sup>	53.338 <sup>134</sup>	65.90 <sup>65</sup>	21.908 <sup>177</sup>	88.53 <sup>147</sup>	53.054 <sup>109</sup>	18.46 <sup>5</sup>
26.1	53.508 <sup>68</sup>	19.51 <sup>61</sup>	53.248 <sup>90</sup>	65.08 <sup>82</sup>	21.768 <sup>140</sup>	86.68 <sup>185</sup>	52.983 <sup>71</sup>	18.39 <sup>7</sup>
Dec. 6.1	53.480 <sup>28</sup>	20.23 <sup>72</sup>	53.209 <sup>39</sup>	64.13 <sup>95</sup>	21.672 <sup>96</sup>	84.47 <sup>221</sup>	52.955 <sup>28</sup>	18.30 <sup>9</sup>
	13	80	15	105	48	253	17	10
16.1	53.493	21.03	53.224	63.08	21.624	81.94	52.972	18.20
26.0	53.548 <sup>55</sup>	21.91 <sup>88</sup>	53.293 <sup>69</sup>	61.97 <sup>111</sup>	21.626 <sup>2</sup>	79.20 <sup>274</sup>	53.034 <sup>62</sup>	18.10 <sup>10</sup>
36.0	53.644 <sup>96</sup>	22.82 <sup>91</sup>	53.413 <sup>120</sup>	60.83 <sup>114</sup>	21.677 <sup>51</sup>	76.33 <sup>287</sup>	53.139 <sup>106</sup>	18.01 <sup>9</sup>
Mean Place	50.651	28.20	49.557	66.34	20.420	69.57	49.713	23.62
Sec $\delta$ , Tan $\delta$	1.004	-0.088	1.270	-0.782	1.236	+0.726	1.072	-0.387
$D\psi \alpha$ , $D_{\alpha} \alpha$	+0.06	0.00	+0.08	+0.01	+0.04	-0.01	+0.07	+0.01
$D\psi \delta$ , $D_{\delta} \delta$	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0

## APPARENT PLACES OF STARS, 1917.

471

**FOR THE UPPER TRANSIT AT WASHINGTON.**

Washington Mean Time.	$\psi$ Sagittarii. Mag. 4.9		$\delta$ Draconis. Mag. 3.2		$\delta$ Sagittarii. Mag. 5.0		$\theta$ Lyrae. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 10	" ' " -25 23	h m 19 12	" ' " +67 30	h m 19 12	" ' " -19 5	h m 19 13	" ' " +37 58
	s " "	s " "	s " "	s " "	s " "	s " "	s " "	s " "
Jan. 1.0	26.881	66.12	28.76	57.42	46.514	68.82	28.124	67.33
11.0	27.011 <sup>130</sup>	65.74 <sup>38</sup>	28.75 <sup>1</sup>	54.00 <sup>342</sup>	46.639 <sup>125</sup>	68.83 <sup>1</sup>	28.194 <sup>70</sup>	64.38 <sup>295</sup>
21.0	27.183 <sup>172</sup>	65.34 <sup>40</sup>	28.85 <sup>10</sup>	50.57 <sup>343</sup>	46.802 <sup>163</sup>	68.82 <sup>1</sup>	28.312 <sup>118</sup>	61.45 <sup>293</sup>
30.9	27.391 <sup>208</sup>	64.93 <sup>41</sup>	29.05 <sup>20</sup>	47.25 <sup>332</sup>	46.996 <sup>194</sup>	68.77 <sup>5</sup>	28.476 <sup>164</sup>	58.65 <sup>280</sup>
Feb. 9.9	27.629 <sup>238</sup>	64.50 <sup>43</sup>	29.35 <sup>30</sup>	44.19 <sup>306</sup>	47.221 <sup>225</sup>	68.66 <sup>11</sup>	28.681 <sup>205</sup>	56.10 <sup>255</sup>
	264 <sup>48</sup>		39 <sup>39</sup>	270 <sup>270</sup>	250 <sup>250</sup>	18 <sup>18</sup>	243 <sup>243</sup>	220 <sup>220</sup>
19.9	27.893	64.02	29.74	41.49	47.471	68.48	28.924	53.90
Mar. 1.9	28.177 <sup>284</sup>	63.50 <sup>52</sup>	30.22 <sup>48</sup>	39.26 <sup>223</sup>	47.741 <sup>270</sup>	68.19 <sup>29</sup>	29.198 <sup>274</sup>	52.12 <sup>178</sup>
11.8	28.480 <sup>303</sup>	62.92 <sup>58</sup>	30.75 <sup>53</sup>	37.59 <sup>167</sup>	48.028 <sup>287</sup>	67.79 <sup>40</sup>	29.498 <sup>300</sup>	50.86 <sup>126</sup>
21.8	28.796 <sup>316</sup>	62.29 <sup>63</sup>	31.33 <sup>58</sup>	36.53 <sup>106</sup>	48.330 <sup>302</sup>	67.27 <sup>52</sup>	29.818 <sup>320</sup>	50.16 <sup>70</sup>
31.8	29.121 <sup>325</sup>	61.60 <sup>69</sup>	31.93 <sup>60</sup>	36.14 <sup>39</sup>	48.641 <sup>311</sup>	66.64 <sup>63</sup>	30.151 <sup>333</sup>	50.05 <sup>11</sup>
	332 <sup>72</sup>		61 <sup>61</sup>	26 <sup>26</sup>	316 <sup>316</sup>	73 <sup>73</sup>	340 <sup>340</sup>	48 <sup>48</sup>
Apr. 10.7	29.453	60.88	32.54	36.40	48.957	65.91	30.491	50.53
20.7	29.786 <sup>333</sup>	60.15 <sup>73</sup>	33.15 <sup>61</sup>	37.32 <sup>92</sup>	49.276 <sup>319</sup>	65.10 <sup>81</sup>	30.831 <sup>340</sup>	51.57 <sup>104</sup>
30.7	30.115 <sup>329</sup>	59.42 <sup>73</sup>	33.73 <sup>58</sup>	38.84 <sup>152</sup>	49.592 <sup>316</sup>	64.23 <sup>87</sup>	31.163 <sup>332</sup>	53.13 <sup>156</sup>
May 10.7	30.436 <sup>321</sup>	58.73 <sup>69</sup>	34.27 <sup>54</sup>	40.92 <sup>208</sup>	49.899 <sup>307</sup>	63.33 <sup>90</sup>	31.481 <sup>318</sup>	55.17 <sup>204</sup>
20.6	30.741 <sup>305</sup>	58.09 <sup>64</sup>	34.74 <sup>47</sup>	43.47 <sup>255</sup>	50.193 <sup>294</sup>	62.45 <sup>88</sup>	31.775 <sup>294</sup>	57.61 <sup>244</sup>
	286 <sup>55</sup>		41 <sup>41</sup>	295 <sup>295</sup>	276 <sup>276</sup>	85 <sup>85</sup>	266 <sup>266</sup>	275 <sup>275</sup>
30.6	31.027	57.54	35.15	46.42	50.469	61.60	32.041	60.36
June 9.6	31.286 <sup>259</sup>	57.08 <sup>46</sup>	35.48 <sup>33</sup>	49.67 <sup>325</sup>	50.717 <sup>248</sup>	60.82 <sup>78</sup>	32.272 <sup>231</sup>	63.35 <sup>299</sup>
19.6	31.511 <sup>225</sup>	56.75 <sup>33</sup>	35.72 <sup>24</sup>	53.14 <sup>347</sup>	50.934 <sup>217</sup>	60.14 <sup>68</sup>	32.461 <sup>189</sup>	66.48 <sup>313</sup>
29.5	31.699 <sup>188</sup>	56.56 <sup>19</sup>	35.87 <sup>15</sup>	56.72 <sup>358</sup>	51.116 <sup>182</sup>	59.56 <sup>58</sup>	32.605 <sup>144</sup>	69.68 <sup>320</sup>
July 9.5	31.843 <sup>144</sup>	56.48 <sup>8</sup>	35.90 <sup>3</sup>	60.34 <sup>362</sup>	51.256 <sup>140</sup>	59.11 <sup>45</sup>	32.698 <sup>93</sup>	72.87 <sup>319</sup>
	98 <sup>5</sup>		6 <sup>6</sup>	354 <sup>354</sup>	97 <sup>97</sup>	32 <sup>32</sup>	43 <sup>43</sup>	308 <sup>308</sup>
19.5	31.941 <sup>50</sup>	56.53 <sup>16</sup>	35.84 <sup>15</sup>	63.88 <sup>341</sup>	51.353 <sup>48</sup>	58.79 <sup>20</sup>	32.741 <sup>8</sup>	75.95 <sup>293</sup>
29.4	31.991 <sup>1</sup>	56.69 <sup>25</sup>	35.69 <sup>24</sup>	67.29 <sup>320</sup>	51.401 <sup>3</sup>	58.59 <sup>10</sup>	32.733 <sup>60</sup>	78.88 <sup>271</sup>
Aug. 8.4	31.992 <sup>45</sup>	56.94 <sup>31</sup>	35.45 <sup>33</sup>	70.49 <sup>291</sup>	51.404 <sup>41</sup>	58.49 <sup>0</sup>	32.673 <sup>107</sup>	81.59 <sup>243</sup>
18.4	31.947 <sup>88</sup>	57.25 <sup>34</sup>	35.12 <sup>42</sup>	73.40 <sup>256</sup>	51.363 <sup>83</sup>	58.49 <sup>7</sup>	32.566 <sup>151</sup>	84.02 <sup>249</sup>
28.4	31.859 <sup>125</sup>	57.59 <sup>35</sup>	34.70 <sup>48</sup>	75.96 <sup>216</sup>	51.280 <sup>119</sup>	58.56 <sup>14</sup>	32.415 <sup>187</sup>	86.11 <sup>173</sup>
Sept. 7.3	31.734	57.94	34.22	78.12 <sup>172</sup>	51.161 <sup>146</sup>	58.70 <sup>15</sup>	32.228 <sup>218</sup>	87.84 <sup>133</sup>
17.3	31.579 <sup>155</sup>	58.26 <sup>32</sup>	33.68 <sup>54</sup>	79.84 <sup>123</sup>	51.015 <sup>167</sup>	58.85 <sup>15</sup>	32.010 <sup>238</sup>	89.17 <sup>91</sup>
27.3	31.405 <sup>174</sup>	58.52 <sup>26</sup>	33.11 <sup>57</sup>	81.07 <sup>72</sup>	50.848 <sup>177</sup>	59.00 <sup>15</sup>	31.772 <sup>248</sup>	90.08 <sup>46</sup>
Oct. 7.3	31.221 <sup>184</sup>	58.71 <sup>19</sup>	32.52 <sup>59</sup>	81.79 <sup>18</sup>	50.671 <sup>174</sup>	59.15 <sup>13</sup>	31.524 <sup>249</sup>	90.54 <sup>1</sup>
17.2	31.038 <sup>183</sup>	58.81 <sup>10</sup>	31.92 <sup>60</sup>	81.97 <sup>37</sup>	50.497 <sup>164</sup>	59.28 <sup>9</sup>	31.275 <sup>239</sup>	90.53 <sup>47</sup>
	170 <sup>0</sup>		58 <sup>58</sup>					
27.2	30.868	58.81	31.34	81.60	50.333 <sup>141</sup>	59.37 <sup>7</sup>	31.036 <sup>218</sup>	90.06 <sup>93</sup>
Nov. 6.2	30.719 <sup>149</sup>	58.72 <sup>9</sup>	30.78 <sup>56</sup>	80.68 <sup>92</sup>	50.192 <sup>112</sup>	59.44 <sup>4</sup>	30.818 <sup>191</sup>	89.13 <sup>139</sup>
16.1	30.603 <sup>116</sup>	58.55 <sup>17</sup>	30.28 <sup>50</sup>	79.22 <sup>146</sup>	50.080 <sup>76</sup>	59.48 <sup>3</sup>	30.627 <sup>153</sup>	87.74 <sup>182</sup>
26.1	30.525 <sup>78</sup>	58.30 <sup>25</sup>	29.83 <sup>45</sup>	77.24 <sup>198</sup>	50.004 <sup>35</sup>	59.51 <sup>1</sup>	30.474 <sup>110</sup>	85.92 <sup>219</sup>
Dec. 6.1	30.490 <sup>35</sup>	58.00 <sup>30</sup>	29.46 <sup>37</sup>	74.81 <sup>243</sup>	49.969 <sup>9</sup>	59.52 <sup>1</sup>	30.364 <sup>63</sup>	83.73 <sup>251</sup>
	11 <sup>34</sup>		29 <sup>29</sup>	282 <sup>282</sup>				
16.1	30.501	57.66	29.17	71.99	49.978	59.53	30.301	81.22
26.0	30.559 <sup>58</sup>	57.30 <sup>36</sup>	28.99 <sup>18</sup>	68.84 <sup>315</sup>	50.031 <sup>53</sup>	59.55 <sup>2</sup>	30.287 <sup>14</sup>	78.47 <sup>275</sup>
36.0	30.661 <sup>102</sup>	56.92 <sup>38</sup>	28.92 <sup>7</sup>	65.50 <sup>334</sup>	50.126 <sup>95</sup>	59.56 <sup>1</sup>	30.324 <sup>37</sup>	75.57 <sup>290</sup>
Mean Place	27.129	62.96	32.414	55.85	46.758	65.88	29.188	67.19
Sec $\delta$ , Tan $\delta$	1.107	-0.475	2.615	+2.416	1.058	-0.346	1.269	+0.781
D $\psi$ $\alpha$ , D $\alpha$ $\alpha$	+0.07	+0.01	0.00	-0.05	+0.07	+0.01	+0.04	-0.82
D $\delta$ $\delta$ , D $\alpha$ $\delta$	+0.1	-1.0	+0.1	-1.0	+0.1	-1.0	+0.1	-0.9



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\omega$ Aquilæ. Mag. 5.1			$\kappa$ Cygni. Mag. 4.0			$\tau$ Draconis. Mag. 4.6			$\delta$ Aquilæ. Mag. 3.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 19 13	s	° ' " 26	h m 19 15	s	° ' " 12	h m 19 17	s	° ' " 73 11	h m 19 21	s	° ' " 2 56
Jan. 1.0	54.783		40.09	9.264		54.67	4.32		68.70	18.471		52.60
11.0	54.880	97	38.28 181	9.304	40	51.37 330	4.26	6	65.32 338	18.568	97	51.28 133
21.0	55.015	135	36.49 179	9.409	105	48.07 330	4.33	7	61.90 342	18.703	135	49.98 130
30.9	55.183	168	34.82 167	9.578	169	44.89 318	4.55	22	58.57 333	18.870	167	48.78 120
Feb. 9.9	55.382	199	33.32 150	9.807	229	41.97 292	4.91	36	55.48 309	19.065	195	47.72 106
		224	124		281	256		47			221	86
19.9	55.606		32.08	10.088		39.41	5.38		52.73	19.286		46.86
Mar. 1.9	55.852	246	31.14 94	10.416	328	37.32	5.96	58	50.43	19.529	243	46.28
		265	56		366	155		67			262	29
11.8	56.117		30.58 17	10.782	395	35.77 93	6.63	73	48.68 114	19.791		45.99 2
21.8	56.396	279	30.41	11.177	395	34.84 30	7.36	73	47.54 49	20.067	276	46.01 36
31.8	56.685	289	30.65 24	11.589	412	34.54 34	8.14	78	47.05 16	20.354	287	46.37 69
		295	64		420			78			294	
Apr. 10.8	56.980		31.29	12.009		34.88	8.92		47.21	20.648		47.06
20.7	57.278	298	32.31 102	12.427	418	35.87 99	9.70	78	48.02 81	20.946	298	48.05 99
30.7	57.572	294	33.67 136	12.832	405	37.43 156	10.45	75	49.45 143	21.242	296	49.31 126
May 10.7	57.857	285	35.33 166	13.215	383	39.52 209	11.14	69	51.43 198	21.531	289	50.79 148
20.6	58.127	270	37.21 188	13.565	350	42.08 256	11.75	61	53.90 247	21.808	277	52.45 166
		249	207		309	293		52			257	177
30.6	58.376		39.28	13.874		45.01	12.27		56.77	22.065		54.22
June 9.6	58.599	223	41.45 217	14.133	259	48.21 320	12.67	40	59.97 320	22.298	233	56.06 184
19.6	58.792	193	43.67 223	14.338	205	51.61 340	12.95	28	63.38 341	22.501	203	57.91 185
29.5	58.948	156	45.88 221	14.481	143	55.13 352	13.12	17	66.95 357	22.670	169	59.73 182
July 9.5	59.064	116	48.01 213	14.561	80	58.64 351	13.15	3	70.55 360	22.799	129	61.46 173
		74	202		14	344		11			88	160
19.5	59.138		50.03	14.575		62.08	13.04		74.10	22.887		63.06
29.5	59.168	30	51.90 187	14.523	52	65.38 330	12.82	22	77.53 343	22.931	44	64.52 146
Aug. 8.4	59.154	14	53.57 167	14.408	115	68.46 308	12.48	34	80.77 324	22.932	1	65.81 120
		56	147		175	279		46			41	109
18.4	59.098	93	55.04 122	14.233	228	71.25 243	12.02	57	83.74 263	22.891	80	66.90 90
28.4	59.005	126	56.26 97	14.006	274	73.68 205	11.45	66	86.37 225	22.811	114	67.80 69
Sept. 7.3	58.879		57.23 70	13.731		75.73 161	10.79		88.62 181	22.697		68.49 50
17.3	58.727	152	57.93 44	13.420	311	77.34 113	10.08	71	90.43 134	22.556	141	68.99 28
27.3	58.556	171	58.37 16	13.083	337	78.47 63	9.31	77	91.77 84	22.396	160	69.27 9
Oct. 7.3	58.377	179	58.53 12	12.730	353	79.10 12	8.50	81	92.61 30	22.227	169	69.36 11
17.2	58.199	167	58.41 38	12.377	344	79.22 41	7.68	82	92.91 25	22.058	169	69.25 31
27.2	58.032		58.03	12.033		78.81	6.88		92.66	21.898		68.94
Nov. 6.2	57.883	149	57.37 66	11.710	323	77.85 96	6.11	77	91.86 80	21.755	143	68.44 50
16.2	57.761	122	56.45 92	11.422	288	76.39 146	5.40	71	90.51 135	21.639	116	67.75 69
26.1	57.671	90	55.28 117	11.177	245	74.45 194	4.77	54	88.65 186	21.555	84	66.89 86
Dec. 6.1	57.620	51	53.89 139	10.984	193	72.07 238	4.23	53	86.31 234	21.507	48	65.88 101
		11	158		133	276		43			8	116
16.1	57.609		52.31	10.851		69.31	3.80		83.56	21.499		64.72
26.0	57.639	30	50.60 171	10.781	70	68.26 305	3.50	30	80.48 308	21.531	32	63.46 126
36.0	57.710	71	48.80 180	10.778	3	63.02 324	3.35	15	77.18 330	21.603	72	62.14 132
Mean Place	55.236		41.49	11.130		53.51	9.537		66.36	18.819		54.21
Sec $\delta$ , Tan $\delta$	1.020		+0.202	1.670		+1.337	3.460		+3.312	1.001		+0.062
$D\delta$ , $D\alpha$	+0.06		0.00	+0.03		-0.03	-0.02		-0.07	+0.06		0.00
$\delta$ , $D\delta$	+0.1		-0.9	+0.1		-0.9	+0.1		-0.9	+0.1		-0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Cygni. Mag. 3.2		$\gamma$ Cygni. Mag. 3.9		$\mu$ Aquilæ. Mag. 4.6		$\eta$ Sagittarii. Mag. 4.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 27	° ' " +27 46	h m 19 27	° ' " +51 32	h m 19 30	° ' " + 7 11	h m 19 31	° ' " -25 3
	s	"	s	"	s	"	s	"
Jan. 1.0	21.686	64.94	35.110	71.22	1.730	66.15	39.235	67.46
11.0	21.754 <sup>68</sup>	62.40 <sup>254</sup>	35.135 <sup>25</sup>	67.99 <sup>323</sup>	1.817 <sup>87</sup>	64.61 <sup>154</sup>	39.344 <sup>109</sup>	67.05 <sup>41</sup>
21.0	21.864 <sup>110</sup>	59.87 <sup>253</sup>	35.224 <sup>89</sup>	64.74 <sup>325</sup>	1.940 <sup>123</sup>	63.09 <sup>152</sup>	39.493 <sup>149</sup>	66.60 <sup>45</sup>
31.0	22.013 <sup>149</sup>	57.45 <sup>242</sup>	35.373 <sup>149</sup>	61.59 <sup>315</sup>	2.095 <sup>155</sup>	61.66 <sup>143</sup>	39.677 <sup>184</sup>	66.11 <sup>49</sup>
Feb. 9.9	22.197 <sup>184</sup>	55.24 <sup>221</sup>	35.580 <sup>207</sup>	58.66 <sup>293</sup>	2.280 <sup>185</sup>	60.41 <sup>125</sup>	39.893 <sup>216</sup>	65.57 <sup>54</sup>
	218	192	259	260	213	105	244	59
19.9	22.415	53.32	35.839	56.06	2.493	59.36	40.137	64.98
Mar. 1.9	22.662 <sup>247</sup>	51.79 <sup>153</sup>	36.145 <sup>306</sup>	53.91 <sup>215</sup>	2.729 <sup>236</sup>	58.60 <sup>76</sup>	40.405 <sup>268</sup>	64.33 <sup>65</sup>
11.8	22.932 <sup>270</sup>	50.71 <sup>108</sup>	36.490 <sup>345</sup>	52.29 <sup>162</sup>	2.985 <sup>256</sup>	58.15 <sup>45</sup>	40.693 <sup>288</sup>	63.60 <sup>73</sup>
21.8	23.221 <sup>289</sup>	50.12 <sup>59</sup>	36.864 <sup>374</sup>	51.25 <sup>104</sup>	3.257 <sup>272</sup>	58.07 <sup>8</sup>	40.998 <sup>305</sup>	62.81 <sup>79</sup>
31.8	23.526 <sup>305</sup>	50.06 <sup>6</sup>	37.261 <sup>397</sup>	50.85 <sup>40</sup>	3.541 <sup>284</sup>	58.36 <sup>29</sup>	41.316 <sup>318</sup>	61.97 <sup>84</sup>
	313	48	407	23	293	65	327	89
Apr. 10.8	23.839	50.54	37.668	51.08	3.834	59.01	41.643	61.08
20.7	24.155 <sup>316</sup>	51.52 <sup>98</sup>	38.077 <sup>409</sup>	51.93 <sup>85</sup>	4.132 <sup>298</sup>	59.99 <sup>96</sup>	41.976 <sup>333</sup>	60.17 <sup>91</sup>
30.7	24.468 <sup>313</sup>	52.97 <sup>145</sup>	38.477 <sup>400</sup>	53.39 <sup>146</sup>	4.429 <sup>297</sup>	61.29 <sup>130</sup>	42.309 <sup>333</sup>	59.27 <sup>90</sup>
May 10.7	24.771 <sup>303</sup>	54.82 <sup>185</sup>	38.859 <sup>382</sup>	55.38 <sup>199</sup>	4.720 <sup>291</sup>	62.86 <sup>157</sup>	42.637 <sup>328</sup>	58.40 <sup>87</sup>
20.7	25.059 <sup>288</sup>	57.05 <sup>223</sup>	39.212 <sup>363</sup>	57.83 <sup>245</sup>	4.999 <sup>279</sup>	64.63 <sup>177</sup>	42.954 <sup>317</sup>	57.60 <sup>80</sup>
	264	251	316	284	260	192	298	70
30.6	25.323	59.56	39.528	60.67	5.259	66.55	43.252	56.90
June 9.6	25.560 <sup>237</sup>	62.27 <sup>271</sup>	39.799 <sup>271</sup>	63.82 <sup>315</sup>	5.497 <sup>238</sup>	68.67 <sup>202</sup>	43.526 <sup>274</sup>	56.30 <sup>60</sup>
19.6	25.761 <sup>201</sup>	65.11 <sup>284</sup>	40.019 <sup>220</sup>	67.18 <sup>336</sup>	5.705 <sup>206</sup>	70.64 <sup>207</sup>	43.769 <sup>243</sup>	55.83 <sup>47</sup>
29.5	25.922 <sup>161</sup>	68.01 <sup>290</sup>	40.181 <sup>162</sup>	70.66 <sup>348</sup>	5.878 <sup>173</sup>	72.67 <sup>203</sup>	43.975 <sup>206</sup>	55.51 <sup>32</sup>
July 9.5	26.040 <sup>118</sup>	70.88 <sup>287</sup>	40.282 <sup>101</sup>	74.17 <sup>351</sup>	6.012 <sup>134</sup>	74.63 <sup>196</sup>	44.139 <sup>164</sup>	55.36 <sup>15</sup>
	72	279	37	346	93	186	119	2
19.5	26.112	73.67	40.319	77.63	6.105	76.49	44.258	55.34
29.5	26.136 <sup>24</sup>	76.30 <sup>263</sup>	40.293 <sup>26</sup>	80.97 <sup>334</sup>	6.154 <sup>49</sup>	78.18 <sup>169</sup>	44.328 <sup>70</sup>	55.45 <sup>11</sup>
Aug. 8.4	26.113 <sup>23</sup>	78.74 <sup>244</sup>	40.203 <sup>90</sup>	84.10 <sup>313</sup>	6.159 <sup>5</sup>	79.71 <sup>153</sup>	44.349 <sup>21</sup>	55.69 <sup>24</sup>
18.4	26.045 <sup>68</sup>	80.92 <sup>218</sup>	40.055 <sup>148</sup>	86.96 <sup>286</sup>	6.122 <sup>37</sup>	81.04 <sup>133</sup>	44.322 <sup>27</sup>	56.00 <sup>31</sup>
28.4	25.935 <sup>110</sup>	82.82 <sup>190</sup>	39.854 <sup>201</sup>	89.49 <sup>253</sup>	6.045 <sup>77</sup>	82.13 <sup>109</sup>	44.250 <sup>72</sup>	56.37 <sup>37</sup>
	145	157	248	216	111	88	111	40
Sept. 7.4	25.790	84.39	39.606	91.65	5.934	83.01	44.139	56.77
17.3	25.615 <sup>175</sup>	85.61 <sup>122</sup>	39.321 <sup>285</sup>	93.38 <sup>173</sup>	5.796 <sup>138</sup>	83.64 <sup>63</sup>	43.996 <sup>143</sup>	57.16 <sup>39</sup>
27.3	25.420 <sup>195</sup>	86.45 <sup>84</sup>	39.006 <sup>315</sup>	94.65 <sup>127</sup>	5.636 <sup>160</sup>	84.04 <sup>40</sup>	43.829 <sup>167</sup>	57.52 <sup>36</sup>
Oct. 7.3	25.213 <sup>207</sup>	86.92 <sup>47</sup>	38.676 <sup>330</sup>	95.43 <sup>78</sup>	5.466 <sup>170</sup>	84.20 <sup>16</sup>	43.650 <sup>179</sup>	57.81 <sup>29</sup>
17.2	25.003 <sup>210</sup>	86.98 <sup>6</sup>	38.340 <sup>336</sup>	95.69 <sup>26</sup>	5.294 <sup>172</sup>	84.13 <sup>7</sup>	43.467 <sup>183</sup>	58.01 <sup>20</sup>
	202	35	329	25	164	32	174	11
27.2	24.801	86.63	38.011	95.44	5.130	83.81	43.293	58.12
Nov. 6.2	24.616 <sup>185</sup>	85.88 <sup>75</sup>	37.702 <sup>309</sup>	94.66 <sup>78</sup>	4.982 <sup>148</sup>	83.29 <sup>52</sup>	43.139 <sup>154</sup>	58.13 <sup>1</sup>
16.2	24.456 <sup>160</sup>	84.74 <sup>114</sup>	37.422 <sup>280</sup>	93.36 <sup>130</sup>	4.858 <sup>124</sup>	82.51 <sup>78</sup>	43.012 <sup>127</sup>	58.04 <sup>9</sup>
26.1	24.328 <sup>128</sup>	83.23 <sup>151</sup>	37.180 <sup>242</sup>	91.56 <sup>180</sup>	4.764 <sup>94</sup>	81.54 <sup>97</sup>	42.918 <sup>94</sup>	57.87 <sup>17</sup>
Dec. 6.1	24.237 <sup>91</sup>	81.39 <sup>184</sup>	36.987 <sup>193</sup>	89.32 <sup>224</sup>	4.707 <sup>57</sup>	80.37 <sup>117</sup>	42.866 <sup>52</sup>	57.61 <sup>26</sup>
	49	213	137	263	19	132	9	30
16.1	24.188	79.26	36.850	86.69	4.688	79.05	42.857	57.31
26.1	24.183 <sup>5</sup>	76.91 <sup>235</sup>	36.771 <sup>79</sup>	83.74 <sup>295</sup>	4.708 <sup>20</sup>	77.61 <sup>144</sup>	42.893 <sup>36</sup>	56.96 <sup>35</sup>
36.0	24.221 <sup>38</sup>	74.42 <sup>249</sup>	36.755 <sup>16</sup>	80.60 <sup>314</sup>	4.768 <sup>60</sup>	76.08 <sup>153</sup>	42.973 <sup>80</sup>	56.57 <sup>39</sup>
Mean Place	22.426	64.40	36.836	68.92	2.113	67.10	39.459	64.19
Sec $\delta$ , Tan $\delta$	1.130	+0.527	1.608	+1.260	1.008	+0.127	1.104	-0.468
$D_{\delta} \alpha$ , $D_{\alpha} \alpha$	+0.05	-0.01	+0.03	-0.03	+0.06	0.00	+0.07	+0.07
$D_{\delta} \delta$ , $D_{\alpha} \delta$	+0.1	-0.9	+0.1	-0.9	+0.2	-0.9	+0.2	-0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Aquilæ. Mag. 5.0		$\theta$ Cygni. Mag. 4.6		$\delta$ Sagittarii. Mag. 5.4		$\beta$ Sagittæ. Mag. 4.4	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 32 s	° ' " — 7 12 "	h m 19 34 s	° ' " +50 1 "	h m 19 35 s	° ' " —16 28 "	h m 19 37 s	° ' " +17 16 "
Jan. 1.0	25.381	48.17	11.352	44.90	57.948	66.99	18.730	58.95
11.0	25.475 <sup>94</sup>	48.86 <sup>69</sup>	11.371 <sup>19</sup>	41.73 <sup>317</sup>	58.045 <sup>97</sup>	67.11 <sup>12</sup>	18.800 <sup>70</sup>	56.92 <sup>203</sup>
21.0	25.606 <sup>131</sup>	49.51 <sup>65</sup>	11.451 <sup>80</sup>	38.53 <sup>320</sup>	58.181 <sup>136</sup>	67.18 <sup>7</sup>	18.907 <sup>107</sup>	54.89 <sup>208</sup>
31.0	25.770 <sup>164</sup>	50.11 <sup>60</sup>	11.591 <sup>140</sup>	35.41 <sup>312</sup>	58.351 <sup>170</sup>	67.20 <sup>2</sup>	19.050 <sup>143</sup>	52.96 <sup>193</sup>
Feb. 9.9	25.962 <sup>192</sup>	50.58 <sup>47</sup>	11.786 <sup>105</sup>	32.49 <sup>292</sup>	58.551 <sup>200</sup>	67.13 <sup>7</sup>	19.226 <sup>176</sup>	51.20 <sup>176</sup>
	220	31	246	259	226	17	205	149
19.9	26.182	50.89	12.032	29.90	58.777	66.96	19.431	49.71
Mar. 1.9	26.422 <sup>240</sup>	51.02 <sup>13</sup>	12.324 <sup>292</sup>	27.74 <sup>216</sup>	59.027 <sup>250</sup>	66.66 <sup>30</sup>	19.662 <sup>231</sup>	48.54 <sup>117</sup>
11.8	26.683 <sup>261</sup>	50.95 <sup>7</sup>	12.654 <sup>330</sup>	26.09 <sup>165</sup>	59.295 <sup>268</sup>	66.22 <sup>44</sup>	19.916 <sup>234</sup>	47.75 <sup>79</sup>
21.8	26.959 <sup>276</sup>	50.63 <sup>32</sup>	13.015 <sup>361</sup>	25.02 <sup>107</sup>	59.581 <sup>286</sup>	65.64 <sup>58</sup>	20.188 <sup>272</sup>	47.39 <sup>36</sup>
31.8	27.248 <sup>289</sup>	50.08 <sup>55</sup>	13.398 <sup>383</sup>	24.58 <sup>44</sup>	59.881 <sup>300</sup>	64.91 <sup>73</sup>	20.475 <sup>287</sup>	47.48 <sup>9</sup>
	297	77	397	18	309	86	297	53
Apr. 10.8	27.545	49.31	13.795	24.76	60.190	64.05	20.772	48.01
20.7	27.848 <sup>303</sup>	48.33 <sup>98</sup>	14.194 <sup>399</sup>	25.56 <sup>80</sup>	60.504 <sup>314</sup>	63.08 <sup>97</sup>	21.074 <sup>302</sup>	48.97 <sup>96</sup>
30.7	28.151 <sup>303</sup>	47.17 <sup>116</sup>	14.587 <sup>393</sup>	26.97 <sup>141</sup>	60.820 <sup>316</sup>	62.03 <sup>105</sup>	21.376 <sup>302</sup>	50.33 <sup>136</sup>
May 10.7	28.449 <sup>298</sup>	45.89 <sup>128</sup>	14.965 <sup>378</sup>	28.90 <sup>193</sup>	61.131 <sup>311</sup>	60.93 <sup>110</sup>	21.672 <sup>296</sup>	52.04 <sup>171</sup>
20.7	28.737 <sup>288</sup>	44.51 <sup>138</sup>	15.316 <sup>351</sup>	31.31 <sup>241</sup>	61.431 <sup>300</sup>	59.82 <sup>111</sup>	21.957 <sup>285</sup>	54.05 <sup>201</sup>
	271	143	317	279	285	106	265	222
30.6	29.008	43.08	15.633	34.10	61.716	58.74	22.222	56.27
June 9.6	29.256 <sup>248</sup>	41.66 <sup>142</sup>	15.908 <sup>275</sup>	37.21 <sup>311</sup>	61.977 <sup>261</sup>	57.71 <sup>103</sup>	22.463 <sup>241</sup>	58.66 <sup>239</sup>
19.6	29.475 <sup>219</sup>	40.26 <sup>140</sup>	16.134 <sup>226</sup>	40.54 <sup>333</sup>	62.211 <sup>234</sup>	56.78 <sup>93</sup>	22.673 <sup>210</sup>	61.14 <sup>248</sup>
29.5	29.661 <sup>186</sup>	38.95 <sup>131</sup>	16.305 <sup>171</sup>	43.99 <sup>345</sup>	62.409 <sup>198</sup>	55.96 <sup>82</sup>	22.847 <sup>174</sup>	63.64 <sup>250</sup>
July 9.5	29.810 <sup>149</sup>	37.75 <sup>120</sup>	16.417 <sup>112</sup>	47.49 <sup>350</sup>	62.568 <sup>159</sup>	55.29 <sup>67</sup>	22.981 <sup>134</sup>	66.11 <sup>247</sup>
	104	107	50	346	115	54	92	238
19.5	29.914	36.68	16.467	50.95	62.683	54.75	23.073	68.49
29.5	29.975 <sup>61</sup>	35.75 <sup>93</sup>	16.455 <sup>12</sup>	54.29 <sup>334</sup>	62.753 <sup>70</sup>	54.35 <sup>40</sup>	23.120 <sup>47</sup>	70.71 <sup>222</sup>
Aug. 8.4	29.992 <sup>17</sup>	34.99 <sup>76</sup>	16.382 <sup>73</sup>	57.43 <sup>314</sup>	62.777 <sup>24</sup>	54.10 <sup>25</sup>	23.121 <sup>1</sup>	72.74 <sup>208</sup>
18.4	29.964 <sup>28</sup>	34.38 <sup>61</sup>	16.252 <sup>130</sup>	60.33 <sup>290</sup>	62.755 <sup>22</sup>	53.97 <sup>13</sup>	23.079 <sup>42</sup>	74.56 <sup>182</sup>
28.4	29.897 <sup>67</sup>	33.92 <sup>46</sup>	16.068 <sup>184</sup>	62.89 <sup>256</sup>	62.690 <sup>65</sup>	53.94 <sup>3</sup>	22.996 <sup>83</sup>	76.11 <sup>155</sup>
	104	32	281	220	101	7	118	128
Sept. 7.4	29.793	33.60	15.837	65.09	62.589	54.01	22.878	77.39
17.3	29.662 <sup>131</sup>	33.43 <sup>17</sup>	15.568 <sup>269</sup>	66.87 <sup>178</sup>	62.456 <sup>133</sup>	54.14 <sup>13</sup>	22.731 <sup>147</sup>	78.38 <sup>99</sup>
27.3	29.509 <sup>153</sup>	33.36 <sup>7</sup>	15.271 <sup>297</sup>	68.20 <sup>133</sup>	62.302 <sup>154</sup>	54.30 <sup>16</sup>	22.562 <sup>169</sup>	79.05 <sup>67</sup>
Oct. 7.3	29.343 <sup>166</sup>	33.40 <sup>4</sup>	14.957 <sup>314</sup>	69.05 <sup>85</sup>	62.133 <sup>169</sup>	54.49 <sup>19</sup>	22.381 <sup>181</sup>	79.40 <sup>35</sup>
17.2	29.177 <sup>166</sup>	33.56 <sup>16</sup>	14.636 <sup>321</sup>	69.40 <sup>35</sup>	61.962 <sup>171</sup>	54.69 <sup>20</sup>	22.197 <sup>184</sup>	79.45 <sup>5</sup>
	159	25	315	18	163	19	178	29
27.2	29.018	33.81	14.321	69.22	61.799	54.88	22.019	79.16
Nov. 6.2	28.875 <sup>143</sup>	34.14 <sup>33</sup>	14.023 <sup>298</sup>	68.52 <sup>70</sup>	61.651 <sup>148</sup>	55.07 <sup>19</sup>	21.856 <sup>163</sup>	78.56 <sup>60</sup>
16.2	28.757 <sup>118</sup>	34.55 <sup>41</sup>	13.752 <sup>271</sup>	67.31 <sup>121</sup>	61.529 <sup>122</sup>	55.24 <sup>17</sup>	21.715 <sup>141</sup>	77.65 <sup>91</sup>
26.1	28.670 <sup>87</sup>	35.04 <sup>49</sup>	13.518 <sup>234</sup>	65.60 <sup>171</sup>	61.439 <sup>90</sup>	55.40 <sup>16</sup>	21.605 <sup>110</sup>	76.43 <sup>122</sup>
Dec. 6.1	28.619 <sup>51</sup>	35.60 <sup>56</sup>	13.330 <sup>188</sup>	63.44 <sup>216</sup>	61.387 <sup>52</sup>	55.56 <sup>16</sup>	21.529 <sup>76</sup>	74.96 <sup>147</sup>
	11	62	136	255	12	15	38	171
16.1	28.608	36.22	13.194	60.89	61.375	55.71	21.491	73.25
26.1	28.637 <sup>29</sup>	36.89 <sup>67</sup>	13.114 <sup>80</sup>	58.03 <sup>286</sup>	61.405 <sup>30</sup>	55.85 <sup>14</sup>	21.492 <sup>1</sup>	71.37 <sup>186</sup>
36.0	28.706 <sup>69</sup>	37.62 <sup>73</sup>	13.094 <sup>20</sup>	54.93 <sup>310</sup>	61.476 <sup>71</sup>	55.98 <sup>13</sup>	21.535 <sup>43</sup>	69.37 <sup>200</sup>
Mean Place	25.638	46.14	12.963	42.06	58.167	64.31	19.243	58.67
Sec $\delta$ , Tan $\delta$	1.008	-0.127	1.557	+1.193	1.043	-0.296	1.048	+0.311
$D\delta a$ , $D_{aa}$	+0.06	0.00	+0.03	-0.03	+0.07	+0.01	+0.05	-0.01
$D\delta \delta$ , $D_{\delta\delta}$	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	15 Cygni. Mag. 5.0		f Sagittarii. Mag. 5.1		γ Aquilæ. Mag. 2.8		δ Cygni. Mag. 3.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 41	° ' " +37 8	h m 19 41	° ' " -19 57	h m 19 42	° ' " +10 24	h m 19 42	° ' " +44 55
	s	"	s	"	s	"	s	"
Jan. 1.0	16.044	74.39	31.089	44.50	18.413	36.36	21.588	42.44
11.0	16.083	71.59	31.183	44.38	18.484	34.68	21.610	39.40
21.0	16.170	68.75	31.316	44.22	18.592	33.03	21.686	36.33
31.0	16.301	65.98	31.483	43.99	18.733	31.46	21.814	33.33
Feb. 9.9	16.475	63.42	31.682	43.70	18.906	30.04	21.992	30.51
19.9	16.688	61.15	31.907	43.32	19.108	28.86	22.216	28.01
Mar. 1.9	16.937	59.28	32.158	42.84	19.333	27.97	22.482	25.91
11.9	17.215	57.87	32.428	42.24	19.582	27.42	22.783	24.30
21.8	17.519	57.00	32.716	41.52	19.848	27.24	23.113	23.25
31.8	17.841	56.69	33.020	40.70	20.129	27.46	23.466	22.81
Apr. 10.8	18.175	56.95	33.333	39.79	20.421	28.07	23.832	22.97
20.7	18.515	57.78	33.653	38.79	20.719	29.05	24.204	23.73
30.7	18.855	59.14	33.975	37.75	21.019	30.37	24.573	25.07
May 10.7	19.184	61.00	34.294	36.70	21.314	31.99	24.929	26.93
20.7	19.495	63.27	34.602	35.67	21.599	33.84	25.267	29.25
30.6	19.785	65.90	34.896	34.69	21.866	35.88	25.575	31.96
June 9.6	20.042	68.79	35.167	33.80	22.111	38.04	25.846	34.98
19.6	20.260	71.89	35.408	33.02	22.327	40.26	26.074	38.20
29.6	20.436	75.07	35.615	32.38	22.510	42.47	26.254	41.56
July 9.5	20.565	78.27	35.782	31.87	22.653	44.63	26.381	44.96
19.5	20.644	81.42	35.905	31.52	22.754	46.68	26.451	48.33
29.5	20.670	84.44	35.982	31.33	22.811	48.58	26.464	51.59
Aug. 8.4	20.644	87.29	36.011	31.26	22.824	50.30	26.420	54.65
18.4	20.569	89.88	35.994	31.30	22.793	51.82	26.321	57.48
28.4	20.448	92.18	35.933	31.45	22.722	53.11	26.173	59.99
Sept. 7.4	20.287	94.12	35.834	31.68	22.616	54.15	25.981	62.15
17.3	20.095	95.69	35.701	31.94	22.481	54.94	25.752	63.92
27.3	19.874	96.85	35.544	32.22	22.323	55.47	25.495	65.25
Oct. 7.3	19.639	97.59	35.374	32.48	22.153	55.73	25.221	66.11
17.3	19.399	97.87	35.200	32.71	21.979	55.73	24.940	66.50
27.2	19.164	97.69	35.032	32.90	21.811	55.48	24.663	66.38
Nov. 6.2	18.943	97.04	34.880	33.05	21.657	54.95	24.401	65.76
16.2	18.745	95.93	34.753	33.14	21.525	54.17	24.163	64.64
26.1	18.579	94.40	34.657	33.19	21.422	53.16	23.958	63.05
Dec. 6.1	18.450	92.47	34.599	33.20	21.353	51.93	23.794	61.02
16.1	18.365	90.20	34.582	33.17	21.320	50.52	23.677	58.61
26.1	18.325	87.65	34.607	33.11	21.326	48.96	23.610	55.89
36.0	18.332	84.90	34.674	33.01	21.370	47.32	23.596	52.95
Mean Place	17.033	72.00	31.295	41.56	18.817	36.48	22.897	39.24
Sec δ, Tan δ	1.255	+0.758	1.064	-0.363	1.017	+0.184	1.412	+0.997
Dψ α, Dω α	+0.04	-0.02	+0.07	+0.01	+0.06	-0.01	+0.04	-0.03
Dψ δ, Dω δ	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\delta$ Sagittæ. Mag. 3.8		$\alpha$ Aquilæ. (Altair.) Mag. 0.9		$\eta$ Aquilæ. Var. 3.7-4.4		$\epsilon$ Draconis. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 43	° ' " +18 19	h m 19 46	° ' " + 8 38	h m 19 48	° ' " + 0 47	h m 19 48	° ' " +70 3
	s	"	s	"	s	"	s	"
Jan. 1.0	40.696	44.37	43.646	53.37	14.429	29.47	23.64	29.12
11.0	40.758	42.31	43.719	51.82	14.503	28.36	23.52	25.86
21.0	40.858	40.25	43.827	50.29	14.613	27.26	23.52	22.49
31.0	40.993	38.28	43.968	48.84	14.754	26.24	23.64	19.13
Feb. 9.9	41.163	36.47	44.141	47.55	14.927	25.36	23.87	15.91
19.9	41.363	34.93	44.342	46.49	15.127	24.68	24.21	12.98
Mar. 1.9	41.588	33.71	44.568	45.70	15.350	24.22	24.66	10.44
11.9	41.839	32.87	44.815	45.24	15.595	24.04	25.19	8.38
21.8	42.109	32.47	45.082	45.15	15.859	24.16	25.79	6.89
31.8	42.395	32.52	45.362	45.43	16.137	24.58	26.43	6.04
Apr. 10.8	42.692	33.02	45.654	46.09	16.427	25.30	27.11	5.82
20.7	42.996	33.96	45.953	47.09	16.725	26.30	27.79	6.27
30.7	43.300	35.31	46.253	48.43	17.025	27.58	28.46	7.34
May 10.7	43.600	37.02	46.550	50.05	17.322	29.04	29.10	9.01
20.7	43.888	39.04	46.836	51.89	17.611	30.69	29.69	11.20
30.6	44.158	41.28	47.107	53.90	17.885	32.44	30.21	13.86
June 9.6	44.404	43.70	47.354	56.03	18.137	34.24	30.65	16.89
19.6	44.619	46.23	47.572	58.19	18.362	36.06	30.99	20.21
29.6	44.799	48.78	47.758	60.35	18.555	37.83	31.24	23.74
July 9.5	44.939	51.30	47.905	62.43	18.710	39.50	31.37	27.38
19.5	45.036	53.74	48.010	64.41	18.823	41.07	31.40	31.03
29.5	45.087	56.04	48.071	66.24	18.893	42.49	31.31	34.63
Aug. 8.4	45.093	58.14	48.087	67.89	18.919	43.72	31.12	38.06
18.4	45.055	60.03	48.061	69.33	18.902	44.78	30.82	41.33
28.4	44.976	61.66	47.994	70.54	18.843	45.64	30.43	44.29
Sept. 7.4	44.861	63.02	47.892	71.53	18.748	46.30	29.96	46.90
17.3	44.716	64.06	47.760	72.26	18.623	46.77	29.41	49.12
27.3	44.548	64.80	47.607	72.75	18.477	47.05	28.81	50.89
Oct. 7.3	44.368	65.23	47.439	73.98	18.316	47.15	28.17	52.17
17.3	44.183	65.31	47.269	72.97	18.150	47.07	27.51	52.93
27.2	44.003	65.07	47.105	72.71	17.989	46.81	26.85	53.14
Nov. 6.2	43.837	64.50	46.953	72.22	17.840	46.39	26.20	52.79
16.2	43.693	63.61	46.824	71.48	17.714	45.81	25.58	51.86
26.1	43.578	62.41	46.723	70.54	17.616	45.08	25.03	50.39
Dec. 6.1	43.496	60.94	46.656	69.38	17.552	44.22	24.54	48.41
16.1	43.451	59.22	46.625	68.06	17.524	43.25	24.14	45.96
26.1	43.446	57.32	46.633	66.62	17.534	42.18	23.83	43.13
36.0	43.481	55.30	46.678	65.09	17.582	41.07	23.64	39.99
Mean Place	41.215	43.62	44.024	53.59	14.719	30.35	27.750	23.40
Sec $\delta$ , Tan $\delta$	1.053	+0.331	1.012	+0.152	1.000	+0.014	2.932	+2.756
$D\psi\alpha$ , $D\omega\alpha$	+0.05	-0.01	+0.06	0.00	+0.06	0.00	0.00	-0.06
$D\psi\delta$ , $D\omega\delta$	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Sagittarii. Mag. 4.2		$\epsilon$ Pavonis. Mag. 4.1		$\beta$ Aquilæ. Mag. 3.9		$\gamma$ Sagittæ. Mag. 3.7	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 49 s	° ' -42 5	h m 19 50 s	° ' -73 7	h m 19 51 s	° ' + 6 11	h m 19 55 s	° ' +19 15
Jan. 1.1	31.909	19.32	58.82	57.44	13.837	54.90	3.417	58.96
11.0	32.008	17.83	58.94	54.37	13.903	53.47	3.467	56.90
21.0	32.156	16.27	59.20	51.26	14.005	52.06	3.554	54.83
31.0	32.350	14.68	59.57	48.19	14.140	50.72	3.679	52.83
Feb. 9.9	32.583	13.09	60.07	45.22	14.307	49.54	3.837	50.98
19.9	32.854	11.52	60.66	42.42	14.501	48.56	4.026	49.39
Mar. 1.9	33.158	10.00	61.36	39.87	14.721	47.85	4.244	48.12
11.9	33.488	8.54	62.13	37.59	14.962	47.44	4.487	47.23
21.8	33.841	7.16	62.96	35.64	15.224	47.38	4.752	46.76
31.8	34.213	5.89	63.83	34.05	15.501	47.67	5.034	46.75
Apr. 10.8	34.599	4.75	64.73	32.84	15.791	48.31	5.330	47.20
20.7	34.994	3.75	65.66	32.04	16.088	49.28	5.636	48.10
30.7	35.392	2.92	66.58	31.66	16.388	50.57	5.943	49.41
May 10.7	35.786	2.30	67.48	31.70	16.686	52.12	6.247	51.10
20.7	36.170	1.88	68.35	32.17	16.974	53.87	6.541	53.11
30.6	36.535	1.70	69.16	33.04	17.248	55.77	6.819	55.36
June 9.6	36.871	1.75	69.88	34.32	17.500	57.78	7.073	57.80
19.6	37.173	2.05	70.53	35.95	17.724	59.82	7.297	60.36
29.6	37.433	2.56	71.07	37.88	17.917	61.84	7.488	62.96
July 9.5	37.644	3.30	71.49	40.08	18.071	63.80	7.639	65.54
19.5	37.801	4.20	71.77	42.46	18.183	65.65	7.746	68.05
29.5	37.901	5.25	71.92	44.95	18.252	67.34	7.808	70.42
Aug. 8.4	37.940	6.41	71.93	47.46	18.276	68.87	7.824	72.61
18.4	37.920	7.61	71.78	49.92	18.257	70.20	7.796	74.59
28.4	37.846	8.79	71.52	52.23	18.197	71.30	7.725	76.31
Sept. 7.4	37.721	9.92	71.13	54.29	18.102	72.19	7.617	77.76
17.3	37.554	10.94	70.63	56.02	17.975	72.84	7.478	78.90
27.3	37.355	11.79	70.05	57.35	17.826	73.28	7.315	79.73
Oct. 7.3	37.134	12.40	69.41	58.22	17.662	73.47	7.137	80.24
17.3	36.906	12.77	68.74	58.57	17.494	73.45	6.953	80.40
27.2	36.683	12.86	68.08	58.38	17.330	73.19	6.772	80.23
Nov. 6.2	36.477	12.67	67.46	57.66	17.179	72.72	6.604	79.73
16.2	36.300	12.21	66.89	56.41	17.048	72.04	6.454	78.90
26.1	36.160	11.48	66.41	54.67	16.945	71.16	6.332	77.75
Dec. 6.1	36.068	10.52	66.03	52.50	16.875	70.10	6.242	76.32
16.1	36.026	9.35	65.78	49.97	16.841	68.87	6.188	74.64
26.1	36.035	8.04	65.67	47.18	16.843	67.54	6.172	72.76
36.0	36.098	6.61	65.69	44.20	16.883	66.13	6.195	70.74
Mean Place	32.212	14.69	60.707	51.67	14.175	55.08	3.931	57.45
Sec $\delta$ , Tan $\delta$	1.348	-0.903	3.446	-3.298	1.006	+0.109	1.059	+0.350
$D\psi\alpha$ , $D_\omega\alpha$	+0.08	+0.03	+0.14	+0.10	+0.06	0.00	+0.05	-0.05
$D\psi\delta$ , $D_\omega\delta$	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Sagittarii. Mag. 4.6		$\tau$ Aquilæ. Mag. 5.6		$\theta$ Aquilæ. Mag. 3.4		$\circ$ Cygni seq. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 19 57 s	° ' -27 56 "	h m 20 0 s	° ' + 7 2 "	h m 20 7 s	° ' - 1 3 "	h m 20 10 s	° ' +46 28 "
Jan. 1.1	33.222	33.32	4.806	35.65	1.133	67.00	59.832	26.67
11.0	33.305 <sup>83</sup>	32.68 <sup>64</sup>	4.864 <sup>58</sup>	34.22 <sup>143</sup>	1.190 <sup>57</sup>	67.96 <sup>96</sup>	59.813 <sup>19</sup>	23.76 <sup>291</sup>
21.0	33.428 <sup>123</sup>	31.95 <sup>73</sup>	4.956 <sup>92</sup>	32.80 <sup>142</sup>	1.282 <sup>92</sup>	68.90 <sup>94</sup>	59.848 <sup>35</sup>	20.73 <sup>308</sup>
31.0	33.588 <sup>160</sup>	31.18 <sup>77</sup>	5.083 <sup>127</sup>	31.45 <sup>135</sup>	1.407 <sup>125</sup>	69.76 <sup>86</sup>	59.937 <sup>89</sup>	17.70 <sup>308</sup>
Feb. 10.0	33.780 <sup>192</sup>	30.35 <sup>83</sup>	5.241 <sup>158</sup>	30.26 <sup>110</sup>	1.563 <sup>156</sup>	70.48 <sup>72</sup>	60.080 <sup>143</sup>	14.81 <sup>288</sup>
19.9	34.005 <sup>225</sup>	29.45 <sup>90</sup>	5.427 <sup>186</sup>	29.26 <sup>100</sup>	1.746 <sup>183</sup>	71.03 <sup>55</sup>	60.272 <sup>192</sup>	12.17 <sup>264</sup>
Mar. 1.9	34.257 <sup>252</sup>	28.50 <sup>95</sup>	5.640 <sup>213</sup>	28.54 <sup>72</sup>	1.956 <sup>210</sup>	71.36 <sup>33</sup>	60.510 <sup>238</sup>	9.89 <sup>228</sup>
11.9	34.532 <sup>275</sup>	27.49 <sup>101</sup>	5.875 <sup>235</sup>	28.11 <sup>43</sup>	2.189 <sup>233</sup>	71.44 <sup>8</sup>	60.790 <sup>280</sup>	8.05 <sup>184</sup>
21.8	34.829 <sup>297</sup>	26.43 <sup>106</sup>	6.132 <sup>257</sup>	28.03 <sup>8</sup>	2.443 <sup>254</sup>	71.23 <sup>21</sup>	61.107 <sup>317</sup>	6.74 <sup>131</sup>
31.8	35.143 <sup>314</sup>	25.34 <sup>109</sup>	6.406 <sup>274</sup>	28.31 <sup>28</sup>	2.715 <sup>272</sup>	70.74 <sup>49</sup>	61.453 <sup>346</sup>	6.00 <sup>74</sup>
Apr. 10.8	35.470 <sup>327</sup>	24.23 <sup>111</sup>	6.693 <sup>287</sup>	28.95 <sup>64</sup>	3.001 <sup>286</sup>	69.96 <sup>78</sup>	61.819 <sup>366</sup>	5.87 <sup>11</sup>
20.8	35.807 <sup>337</sup>	23.12 <sup>111</sup>	6.989 <sup>296</sup>	29.92 <sup>97</sup>	3.298 <sup>297</sup>	68.92 <sup>104</sup>	62.198 <sup>379</sup>	6.36 <sup>41</sup>
30.7	36.149 <sup>342</sup>	22.05 <sup>107</sup>	7.290 <sup>301</sup>	31.22 <sup>130</sup>	3.600 <sup>302</sup>	67.63 <sup>129</sup>	62.582 <sup>384</sup>	7.42 <sup>104</sup>
May 10.7	36.490 <sup>341</sup>	21.05 <sup>100</sup>	7.589 <sup>299</sup>	32.79 <sup>157</sup>	3.903 <sup>303</sup>	66.15 <sup>148</sup>	62.960 <sup>378</sup>	9.04 <sup>16</sup>
20.7	36.823 <sup>333</sup>	20.14 <sup>91</sup>	7.880 <sup>291</sup>	34.57 <sup>178</sup>	4.200 <sup>297</sup>	64.51 <sup>164</sup>	63.324 <sup>364</sup>	11.15 <sup>211</sup>
30.7	37.142 <sup>319</sup>	19.36 <sup>78</sup>	8.158 <sup>278</sup>	36.52 <sup>195</sup>	4.485 <sup>285</sup>	62.77 <sup>174</sup>	63.662 <sup>338</sup>	13.69 <sup>25</sup>
June 9.6	37.439 <sup>297</sup>	18.71 <sup>65</sup>	8.415 <sup>257</sup>	38.57 <sup>205</sup>	4.750 <sup>265</sup>	60.99 <sup>178</sup>	63.967 <sup>305</sup>	16.57 <sup>268</sup>
19.6	37.707 <sup>268</sup>	18.24 <sup>47</sup>	8.647 <sup>232</sup>	40.67 <sup>210</sup>	4.991 <sup>241</sup>	59.21 <sup>178</sup>	64.232 <sup>285</sup>	19.73 <sup>310</sup>
29.6	37.942 <sup>235</sup>	17.96 <sup>28</sup>	8.845 <sup>198</sup>	42.77 <sup>210</sup>	5.200 <sup>209</sup>	57.48 <sup>173</sup>	64.450 <sup>218</sup>	23.07 <sup>334</sup>
July 9.5	38.135 <sup>193</sup>	17.86 <sup>10</sup>	9.006 <sup>161</sup>	44.80 <sup>203</sup>	5.372 <sup>172</sup>	55.86 <sup>162</sup>	64.615 <sup>165</sup>	28.50 <sup>84</sup>
19.5	38.282 <sup>147</sup>	17.93 <sup>7</sup>	9.127 <sup>121</sup>	46.73 <sup>193</sup>	5.504 <sup>132</sup>	54.34 <sup>152</sup>	64.723 <sup>108</sup>	29.95 <sup>341</sup>
29.5	38.380 <sup>98</sup>	18.17 <sup>24</sup>	9.204 <sup>77</sup>	48.52 <sup>179</sup>	5.593 <sup>89</sup>	52.98 <sup>136</sup>	64.773 <sup>50</sup>	33.34 <sup>338</sup>
Aug. 8.5	38.427 <sup>47</sup>	18.54 <sup>37</sup>	9.236 <sup>32</sup>	50.12 <sup>160</sup>	5.637 <sup>44</sup>	51.81 <sup>117</sup>	64.764 <sup>9</sup>	36.59 <sup>321</sup>
18.4	38.423 <sup>4</sup>	19.02 <sup>48</sup>	9.224 <sup>12</sup>	51.54 <sup>142</sup>	5.637 <sup>0</sup>	50.81 <sup>100</sup>	64.698 <sup>66</sup>	39.63 <sup>304</sup>
28.4	38.372 <sup>51</sup>	19.58 <sup>56</sup>	9.171 <sup>53</sup>	52.73 <sup>119</sup>	5.594 <sup>43</sup>	50.00 <sup>81</sup>	64.578 <sup>120</sup>	42.41 <sup>277</sup>
Sept. 7.4	38.279 <sup>93</sup>	20.17 <sup>59</sup>	9.082 <sup>89</sup>	53.69 <sup>96</sup>	5.514 <sup>80</sup>	49.39 <sup>61</sup>	64.409 <sup>169</sup>	44.86 <sup>241</sup>
17.4	38.148 <sup>131</sup>	20.76 <sup>59</sup>	8.960 <sup>122</sup>	54.41 <sup>72</sup>	5.401 <sup>113</sup>	48.96 <sup>43</sup>	64.199 <sup>210</sup>	46.94 <sup>201</sup>
27.3	37.989 <sup>159</sup>	21.31 <sup>55</sup>	8.815 <sup>145</sup>	54.91 <sup>50</sup>	5.264 <sup>137</sup>	48.72 <sup>24</sup>	63.957 <sup>242</sup>	48.61 <sup>16</sup>
Oct. 7.3	37.813 <sup>176</sup>	21.78 <sup>47</sup>	8.654 <sup>161</sup>	55.16 <sup>25</sup>	5.110 <sup>154</sup>	48.64 <sup>8</sup>	63.690 <sup>267</sup>	49.83 <sup>12</sup>
17.3	37.628 <sup>185</sup>	22.14 <sup>36</sup>	8.487 <sup>167</sup>	55.18 <sup>2</sup>	4.949 <sup>161</sup>	48.72 <sup>8</sup>	63.410 <sup>280</sup>	49.83 <sup>7</sup>
27.2	37.446 <sup>182</sup>	22.36 <sup>22</sup>	8.323 <sup>164</sup>	54.97 <sup>21</sup>	4.789 <sup>160</sup>	48.96 <sup>24</sup>	63.128 <sup>282</sup>	50.57 <sup>2</sup>
Nov. 6.2	37.280 <sup>166</sup>	22.46 <sup>10</sup>	8.169 <sup>154</sup>	54.54 <sup>43</sup>	4.640 <sup>149</sup>	48.96 <sup>37</sup>	63.128 <sup>274</sup>	50.82 <sup>2</sup>
16.2	37.135 <sup>145</sup>	22.42 <sup>4</sup>	8.035 <sup>134</sup>	53.88 <sup>66</sup>	4.509 <sup>131</sup>	49.33 <sup>51</sup>	62.854 <sup>255</sup>	50.55 <sup>7</sup>
26.2	37.023 <sup>112</sup>	22.23 <sup>19</sup>	7.928 <sup>107</sup>	53.02 <sup>86</sup>	4.405 <sup>104</sup>	49.84 <sup>65</sup>	62.599 <sup>229</sup>	49.77 <sup>12</sup>
Dec. 6.1	36.947 <sup>76</sup>	21.91 <sup>32</sup>	7.852 <sup>76</sup>	51.98 <sup>104</sup>	4.331 <sup>74</sup>	51.25 <sup>76</sup>	62.370 <sup>193</sup>	48.49 <sup>17</sup>
16.1	36.913 <sup>34</sup>	21.49 <sup>42</sup>	7.809 <sup>43</sup>	50.77 <sup>121</sup>	4.289 <sup>42</sup>	52.10 <sup>85</sup>	62.177 <sup>152</sup>	46.74 <sup>21</sup>
26.1	36.923 <sup>10</sup>	20.98 <sup>51</sup>	7.803 <sup>6</sup>	49.44 <sup>133</sup>	4.285 <sup>4</sup>	53.02 <sup>92</sup>	62.025 <sup>104</sup>	44.57 <sup>2</sup>
36.1	36.976 <sup>53</sup>	20.38 <sup>60</sup>	7.835 <sup>32</sup>	48.03 <sup>141</sup>	4.317 <sup>32</sup>	53.99 <sup>97</sup>	61.921 <sup>53</sup>	42.03 <sup>2</sup>
Mean Place	33.406	29.64	5.136	35.37	1.371	66.48	61.132	20.71
Sec $\delta$ , Tan $\delta$	1.132	-0.530	1.008	+0.124	1.000	-0.019	1.452	+1.053
$D\alpha$ , $D_{\alpha}$	+0.07	+0.02	+0.06	0.00	+0.06	0.00	+0.04	-0.04
$D\delta$ , $D_{\delta}$	+0.2	-0.9	+0.2	-0.9	+0.2	-0.9	+0.2	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Cephei. Mag. 4.4		$\gamma$ Vulpeculæ. Mag. 5.4		$\alpha^2$ Capricorni. Mag. 3.8		$\beta$ Capricorni. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 11	° ' " +77 27	h m 20 13	° ' " +24 24	h m 20 13	° ' " -12 47	h m 20 16	° ' " -15 2
	s 35.66	" 51.93	s 35.66	" 51.93	s 35.66	" 51.93	s 35.66	" 51.93
Jan. 1.1	35.66	51.93	35.66	51.93	35.66	51.93	35.66	51.93
11.0	35.32	48.85	35.32	48.85	35.32	48.85	35.32	48.85
21.0	35.14	45.59	35.14	45.59	35.14	45.59	35.14	45.59
31.0	35.16	42.27	35.16	42.27	35.16	42.27	35.16	42.27
Feb. 10.0	35.38	39.01	35.38	39.01	35.38	39.01	35.38	39.01
19.9	35.78	35.95	35.78	35.95	35.78	35.95	35.78	35.95
Mar. 1.9	36.36	33.21	36.36	33.21	36.36	33.21	36.36	33.21
11.9	37.08	30.89	37.08	30.89	37.08	30.89	37.08	30.89
21.8	37.92	29.00	37.92	29.00	37.92	29.00	37.92	29.00
31.8	38.86	27.87	38.86	27.87	38.86	27.87	38.86	27.87
Apr. 10.8	39.87	27.28	39.87	27.28	39.87	27.28	39.87	27.28
20.8	40.90	27.34	40.90	27.34	40.90	27.34	40.90	27.34
30.7	41.93	28.03	41.93	28.03	41.93	28.03	41.93	28.03
May 10.7	42.91	29.32	42.91	29.32	42.91	29.32	42.91	29.32
20.7	43.83	31.17	43.83	31.17	43.83	31.17	43.83	31.17
30.7	44.66	33.53	44.66	33.53	44.66	33.53	44.66	33.53
June 9.6	45.36	36.30	45.36	36.30	45.36	36.30	45.36	36.30
19.6	45.92	39.43	45.92	39.43	45.92	39.43	45.92	39.43
29.6	46.34	42.81	46.34	42.81	46.34	42.81	46.34	42.81
July 9.5	46.59	46.37	46.59	46.37	46.59	46.37	46.59	46.37
19.5	46.66	50.01	46.66	50.01	46.66	50.01	46.66	50.01
29.5	46.57	53.66	46.57	53.66	46.57	53.66	46.57	53.66
Aug. 8.5	46.32	57.22	46.32	57.22	46.32	57.22	46.32	57.22
18.4	45.89	60.65	45.89	60.65	45.89	60.65	45.89	60.65
28.4	45.33	63.85	45.33	63.85	45.33	63.85	45.33	63.85
Sept. 7.4	44.63	66.76	44.63	66.76	44.63	66.76	44.63	66.76
17.4	43.80	69.32	43.80	69.32	43.80	69.32	43.80	69.32
27.3	42.89	71.47	42.89	71.47	42.89	71.47	42.89	71.47
Oct. 7.3	41.89	73.16	41.89	73.16	41.89	73.16	41.89	73.16
17.3	40.85	74.36	40.85	74.36	40.85	74.36	40.85	74.36
27.2	39.78	75.03	39.78	75.03	39.78	75.03	39.78	75.03
Nov. 6.2	38.72	75.14	38.72	75.14	38.72	75.14	38.72	75.14
16.2	37.69	74.67	37.69	74.67	37.69	74.67	37.69	74.67
26.2	36.72	73.63	36.72	73.63	36.72	73.63	36.72	73.63
Dec. 6.1	35.84	72.05	35.84	72.05	35.84	72.05	35.84	72.05
16.1	35.07	69.96	35.07	69.96	35.07	69.96	35.07	69.96
26.1	34.45	67.42	34.45	67.42	34.45	67.42	34.45	67.42
36.1	33.98	64.51	33.98	64.51	33.98	64.51	33.98	64.51
Mean Place	42.531	43.18	42.531	43.18	42.531	43.18	42.531	43.18
Sec $\delta$ , Tan $\delta$	4.607	+4.497	4.607	+4.497	4.607	+4.497	4.607	+4.497
$D\psi\alpha$ , $D\omega\alpha$	-0.04	-0.16	-0.04	-0.16	-0.04	-0.16	-0.04	-0.16
$D\psi\delta$ , $D\omega\delta$	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Pavonis. Mag. 2.1			$\gamma$ Cygni. Mag. 2.3			$\pi$ Capricorni. Mag. 5.2			$\rho$ Capricorni. Mag. 5.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	s	h	m	s	h	m	s	h	m	s
	20	19	-56 59	20	19	+39 59	20	22	-18 28	20	24	-18 5
	s	"	"	s	"	"	s	"	"	s	"	"
Jan. 1.1	4.805		74.37	13.961	10	31.33	34.193	51	66.92	7.574	49	22.58
11.0	4.858	53	72.05	13.951	37	28.62	34.244	51	66.82	7.623	49	22.51
21.0	4.978	120	69.61	13.988	37	25.81	34.332	88	66.65	7.709	86	22.36
31.0	5.163	185	67.11	14.072	84	22.99	34.455	123	66.38	7.830	121	22.11
Feb. 10.0	5.407	244	64.60	14.203	131	20.29	34.610	155	66.01	7.982	152	21.76
	300		246	174		246	183		48	182		47
19.9	5.707		62.14	14.377		17.83	34.793		65.53	8.164		21.29
Mar. 1.9	6.056	349	59.77	14.593	216	15.71	35.006	213	64.91	8.374	210	20.69
11.9	6.449	393	57.54	14.846	253	14.01	35.243	237	64.15	8.609	235	19.94
21.9	6.881	432	55.50	15.132	286	12.81	35.504	261	63.26	8.868	259	19.06
31.8	7.344	463	53.66	15.447	315	12.16	35.785	281	62.23	9.147	279	18.04
	490		159	335		8	298		115	296		116
Apr. 10.8	7.834		52.07	15.782		12.08	36.083		61.08	9.443		16.88
20.8	8.341	507	50.76	16.132	350	12.59	36.394	311	59.84	9.754	311	15.63
30.7	8.858	517	49.75	16.487	355	13.64	36.714	320	58.53	10.072	318	14.32
May 10.7	9.377	519	49.07	16.840	353	15.22	37.036	322	57.20	10.394	322	12.97
20.7	9.886	509	48.74	17.183	343	17.27	37.356	320	55.88	10.713	319	11.64
	489		2	324		246	309		128	309		129
30.7	10.375		48.76	17.507		19.73	37.665		54.60	11.022		10.35
June 9.6	10.833	458	49.14	17.803	296	22.51	37.958	293	53.42	11.316	294	9.15
19.6	11.249	416	49.86	18.064	261	25.55	38.227	269	52.36	11.585	269	8.05
29.6	11.614	365	50.90	18.284	220	28.75	38.466	239	51.44	11.824	239	7.11
July 9.6	11.918	304	52.22	18.457	173	32.04	38.668	202	50.70	12.026	202	6.35
	234		158	123		330	160		57	161		60
19.5	12.152		53.80	18.580		35.34	38.828		50.13	12.187		5.75
29.5	12.311	159	55.56	18.649	69	38.57	38.943	115	49.75	12.304	117	5.34
Aug. 8.5	12.391	80	57.45	18.664	15	41.66	39.011	68	49.55	12.373	69	5.12
18.4	12.391	0	59.40	18.626	38	44.56	39.031	20	49.50	12.394	21	5.04
28.4	12.315	76	61.33	18.538	88	47.19	39.006	25	49.60	12.370	24	5.12
	148		183	134		234	67		22	66		19
Sept. 7.4	12.167		63.16	18.404		49.53	38.939		49.82	12.304		5.31
17.4	11.957	210	64.81	18.231	173	51.51	38.835	104	50.12	12.202	102	5.60
27.3	11.695	262	66.22	18.027	204	53.10	38.702	133	50.47	12.070	132	5.95
Oct. 7.3	11.395	300	67.30	17.802	225	54.26	38.549	153	50.85	11.918	152	6.32
17.3	11.074	321	68.01	17.563	239	54.98	38.384	165	51.22	11.753	165	6.69
	326		30	242		25	165		35	164		36
27.3	10.748		68.31	17.321		55.23	38.219		51.57	11.589		7.05
Nov. 6.2	10.434	314	68.19	17.085	236	55.00	38.062	157	51.87	11.432	157	7.36
16.2	10.147	287	67.63	16.866	219	54.29	37.922	140	52.11	11.292	140	7.61
26.2	9.902	245	66.67	16.670	196	53.12	37.808	114	52.31	11.177	115	7.82
Dec. 6.1	9.708	194	65.31	16.506	164	51.50	37.724	84	52.44	11.092	85	7.97
	131		170	127		202	51		8	51		9
16.1	9.577		63.61	16.379		49.48	37.673		52.52	11.041		8.06
26.1	9.511	66	61.64	16.294	85	47.14	37.661	12	52.53	11.027	14	8.10
36.1	9.516	5	59.43	16.253	41	44.53	37.686	25	52.48	11.051	24	8.07
Mean Place	5.338		67.87	14.948		25.47	34.314		64.23	7.690		20.02
Sec $\delta$ , Tan $\delta$	1.836		-1.540	1.305		+0.839	1.054		-0.334	1.052		-0.327
$D\psi \alpha$ , $D\omega \alpha$	+0.09		+0.06	+0.04		-0.03	+0.07		+0.01	+0.07		+0.01
$D\psi \delta$ , $D\omega \delta$	+0.2		-0.8	+0.2		-0.8	+0.2		-0.8	+0.2		-0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	41 Cygni. Mag. 4.1			$\theta$ Cephei. Mag. 4.3			$\epsilon$ Delphini. Mag. 4.0			Groombridge 3241. Mag. 6.4		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "
	20	25	+30 5	20	28	+62 42	20	29	+11 1	20	30	+72 14
	s		"	s		"	s		"	s		"
Jan. 1.1	59.639		32.45	9.00		62.60	14.572		15.52	18.15		72.41
11.0	59.644	5	30.09	8.87	13	59.57	14.599	27	13.99	17.89	26	69.42
21.0	59.687	43	27.65	8.82	5	56.36	14.660	61	12.43	17.74	15	66.21
31.0	59.772	85	25.22	8.85	3	53.08	14.754	94	10.93	17.73	1	62.90
Feb. 10.0	59.896	124	22.91	8.97	12	49.86	14.882	128	9.56	17.86	13	59.62
		162	20.9		21	303		158			26	312
19.9	60.058		20.82	9.18		46.83	15.040		8.39	18.12		56.50
Mar. 1.9	60.255	197	19.04	9.47	29	44.11	15.227	187	7.47	18.50	38	53.65
11.9	60.484	229	17.66	9.82	35	41.81	15.442	215	6.87	18.99	49	51.21
21.9	60.744	260	16.73	10.24	42	40.01	15.681	239	6.63	19.57	58	49.26
31.8	61.027	283	16.29	10.71	47	38.79	15.943	282	6.77	20.23	66	47.89
		305	8		50	60		279			72	77
Apr. 10.8	61.332		16.37	11.21		38.19	16.222		7.29	20.95		47.12
20.8	61.650	318	16.98	11.73	52	38.25	16.516	294	8.19	21.70	75	46.99
30.7	61.977	327	18.09	12.26	53	38.93	16.819	303	9.45	22.46	76	47.52
May 10.7	62.304	327	19.66	12.79	53	40.22	17.125	306	11.02	23.21	75	48.65
20.7	62.625	321	21.64	13.30	51	42.08	17.426	301	12.84	23.92	71	50.36
		306	233		47	235		293			65	223
30.7	62.931		23.97	13.77		44.43	17.719		14.89	24.57		52.59
June 9.6	63.216	285	26.59	14.19	42	47.22	17.994	275	17.08	25.15	58	55.28
19.6	63.471	255	29.41	14.54	35	50.37	18.244	250	19.35	25.64	49	58.34
29.6	63.690	219	32.36	14.84	30	53.77	18.465	221	21.66	26.02	33	61.69
July 9.6	63.869	170	35.36	15.05	21	57.36	18.651	186	23.93	26.28	26	65.25
		134	300		14	367		145			16	368
19.5	64.003		38.36	15.19		61.03	18.796		26.11	26.44		68.93
29.5	64.039	86	41.27	15.24	5	64.71	18.897	101	28.16	26.46	2	72.64
Aug. 8.5	64.126	37	44.04	15.21	3	68.32	18.954	57	30.06	26.37	9	76.31
18.4	64.115	11	46.60	15.10	11	71.77	18.966	12	31.75	26.16	21	79.84
28.4	64.057	58	48.92	14.90	20	75.01	18.935	31	33.22	25.84	32	83.18
		101	203		27	294		71			43	307
Sept. 7.4	63.956		50.95	14.63		77.95	18.864		34.44	25.41		86.25
17.4	63.821	135	52.65	14.31	32	80.54	18.759	105	35.42	24.89	52	88.98
27.3	63.656	165	54.01	13.94	37	82.73	18.628	131	36.13	24.29	60	91.35
Oct. 7.3	63.469	187	54.99	13.52	42	84.46	18.477	151	36.59	23.64	46	93.25
17.3	63.271	198	55.57	13.08	44	85.70	18.316	161	36.78	22.94	70	94.65
		202	17		46	70		164			72	88
27.3	63.069		55.74	12.62		86.40	18.152		36.71	22.22		95.53
Nov. 6.2	62.872	197	55.49	12.17	45	86.55	17.994	158	36.37	21.50	72	95.85
16.2	62.690	182	54.83	11.73	44	86.14	17.850	144	35.79	20.79	71	95.59
26.2	62.531	159	53.77	11.32	41	85.14	17.728	122	34.96	20.11	68	94.75
Dec. 6.1	62.400	131	52.34	10.95	37	83.61	17.632	96	33.91	19.49	62	93.34
		100	178		32	203		66			53	193
16.1	62.300		50.56	10.63		81.58	17.566		32.66	18.96		91.41
26.1	62.238	62	48.49	10.38	25	79.09	17.534	32	31.27	18.51	45	89.01
36.1	62.215	23	46.21	10.21	17	76.25	17.536	2	29.77	18.17	34	86.22
Mean Place	60.298		27.48	11.516		53.24	14.877		13.40	22.523		62.00
Sec $\delta$ , Tan $\delta$	1.156		+0.579	2.181		+1.939	1.019		+0.195	3.280		+3.124
$D\psi a$ , $D_w a$	+0.05		-0.02	+0.02		-0.08	+0.06		-0.01	0.00		-0.13
$D\psi \delta$ , $D_w \delta$	+0.2		-0.8	+0.2		-0.8	+0.2		-0.8	+0.2		-0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Indi. Mag. 3.2		$\beta$ Delphini. Mag. 3.7		$\nu$ Capricorni. Mag. 5.3		$\alpha$ Delphini. Mag. 3.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 31	" " -47 34	h m 20 33	" " +14 18	h m 20 35	" " -18 25	h m 20 35	" " +15 37
	s	"	s	"	s	"	s	"
Jan. 1.1	43.698	61.44	39.118	23.33	19.518	56.01	46.640	10.82
11.1	43.737	59.63	39.138	21.64	19.557	55.91	46.657	9.09
21.0	43.828	57.68	39.192	19.93	19.631	55.70	46.707	7.32
31.0	43.971	55.64	39.280	18.28	19.740	55.41	46.792	5.59
Feb. 10.0	44.161	53.52	39.402	16.73	19.880	55.01	46.911	3.99
19.9	44.394	51.40	39.555	15.38	20.051	54.48	47.062	2.58
Mar. 1.9	44.668	49.31	39.738	14.31	20.251	53.81	47.243	1.44
11.9	44.979	47.27	39.950	13.56	20.477	53.00	47.454	0.63
21.9	45.323	45.32	40.187	13.18	20.729	52.04	47.690	0.20
31.8	45.695	43.49	40.449	13.19	21.001	50.94	47.951	0.18
Apr. 10.8	46.092	41.82	40.729	13.63	21.293	49.72	48.231	0.57
20.8	46.507	40.34	41.025	14.47	21.602	48.41	48.526	1.38
30.8	46.934	39.09	41.329	15.69	21.920	47.03	48.832	2.59
May 10.7	47.366	38.08	41.637	17.26	22.243	45.62	49.142	4.15
20.7	47.794	37.36	41.942	19.11	22.566	44.22	49.448	6.00
30.7	48.210	36.92	42.237	21.21	22.881	42.88	49.744	8.12
June 9.6	48.604	36.80	42.515	23.47	23.180	41.62	50.024	10.42
19.6	48.967	36.99	42.769	25.86	23.458	40.50	50.280	12.84
29.6	49.289	37.48	42.994	28.29	23.705	39.52	50.505	15.32
July 9.6	49.563	38.27	43.182	30.71	23.917	38.72	50.695	17.80
19.5	49.782	39.30	43.329	33.06	24.089	38.12	50.844	20.21
29.5	49.940	40.56	43.433	35.29	24.216	37.69	50.949	22.51
Aug. 8.5	50.032	41.99	43.492	37.35	24.296	37.47	51.009	24.65
18.5	50.060	43.51	43.506	39.23	24.328	37.41	51.024	26.60
28.4	50.024	45.08	43.476	40.87	24.313	37.50	50.995	28.32
Sept. 7.4	49.927	46.63	43.406	42.27	24.256	37.74	50.926	29.79
17.4	49.778	48.09	43.303	43.40	24.162	38.06	50.822	30.98
27.3	49.586	49.38	43.172	44.26	24.036	38.44	50.690	31.90
Oct. 7.3	49.361	50.45	43.020	44.82	23.889	38.85	50.538	32.51
17.3	49.117	51.24	42.855	45.09	23.729	39.27	50.372	32.83
27.3	48.866	51.71	42.689	45.09	23.566	39.67	50.204	32.86
Nov. 6.2	48.622	51.83	42.528	44.79	23.408	40.02	50.042	32.57
16.2	48.399	51.60	42.380	44.20	23.265	40.31	49.892	31.99
26.2	48.206	51.02	42.253	43.35	23.145	40.53	49.761	31.14
Dec. 6.2	48.055	50.12	42.150	42.25	23.054	40.70	49.656	30.02
16.1	47.951	48.90	42.078	40.93	22.996	40.79	49.581	28.67
26.1	47.898	47.43	42.039	39.42	22.973	40.82	49.538	27.13
36.1	47.899	45.74	42.033	37.79	22.984	40.77	49.530	25.44
Mean Place	43.960	55.24	39.453	20.44	19.605	53.45	46.988	7.61
Sec $\delta$ , Tan $\delta$	1.482	-1.094	1.032	+0.255	1.054	-0.333	1.038	+0.280
$D_{\phi} \alpha$ , $D_{\omega} \alpha$	+0.08	+0.04	+0.06	-0.01	+0.07	+0.01	+0.06	-0.01
$D_{\phi} \delta$ , $D_{\omega} \delta$	+0.2	-0.8	+0.2	-0.8	+0.2	-0.8	+0.3	-0.8

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Pavonis. Mag. 3.6			$\alpha$ Cygni. (Deneb.) Mag. 1.3			$\delta$ Delphini. Mag. 4.5			$\psi$ Capricorni. Mag. 4.3		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	"	h m	s	"	h m	s	"	h m	s	"
	20 37		-66 29	20 38		+44 58	20 39		+14 46	20 41		-25 33
Jan. 1.1	28.78		77.64	35.010		67.56	34.722		36.84	10.984		74.82
11.1	28.77	i	74.90	34.963	47	64.84	34.736	14	35.16	11.018	34	74.29
21.0	28.85	s	71.99	34.966	3	61.97	34.783	47	33.45	11.090	72	73.65
31.0	29.02	17	69.00	35.020	54	59.05	34.865	82	31.78	11.197	107	72.89
Feb. 10.0	29.28	26	65.99	35.124	104	56.20	34.981	116	30.22	11.338	141	72.04
		34	297	155		265		147	136	173		97
19.9	29.62		63.02	35.279		53.55	35.128		28.86	11.511		71.07
Mar. 1.9	30.04	42	60.17	35.482	203	51.18	35.306	178	27.76	11.715	204	70.00
			285			237			110			107
11.9	30.52	48	57.50	35.729	247	49.23	35.513	207	26.99	11.947	232	68.82
			267			195			77			118
21.9	31.06	54	55.04	36.016	287	47.76	35.746	233	26.59	12.205	258	67.55
			246			147			40			127
31.8	31.64	58	52.85	36.336	320	46.84	36.004	258	26.57	12.487	282	66.21
		62	189	349		35		277	40	303		141
Apr. 10.8	32.26		50.96	36.685		46.49	36.281		26.97	12.790		64.80
			154						81			141
20.8	32.92	66	49.42	37.052	367	46.73	36.574	293	27.78	13.109	319	63.39
			116						120			142
30.8	33.59	67	48.26	37.430	378	47.55	36.879	305	28.98	13.440	331	61.97
May 10.7	34.27	68	47.49	37.809	379	48.93	37.187	308	30.52	13.777	337	60.59
			77			138			154			138
20.7	34.94	67	47.14	38.181	372	50.82	37.492	305	32.37	14.114	337	59.30
		65	8	353		234		298	209	331		117
30.7	35.59		47.22	38.534		53.16	37.790		34.46	14.445		58.13
June 9.6	36.20	61	47.70	38.862	328	55.88	38.072	282	36.74	14.760	315	57.09
			48			272			228			104
19.6	36.76	56	48.59	39.153	291	58.90	38.329	257	39.12	15.053	293	56.24
			89			302			238			85
29.6	37.26	50	49.87	39.402	249	62.13	38.559	230	41.58	15.317	264	55.60
July 9.6	37.66	40	51.48	39.603	201	65.50	38.751	192	44.03	15.544	227	55.16
		33	190	147		343		153	237	186		22
19.5	37.99		53.38	39.750	89	68.93	38.904		46.40	15.730	139	54.94
			213			89			227			1
29.5	38.22	13	55.51	39.839	33	72.34	39.014	110	48.67	15.869	89	54.93
Aug. 8.5	38.35		57.78	39.872		75.65	39.078		50.77	15.958		55.12
			227			331			210			19
18.5	38.36	1	60.13	39.849	23	78.78	39.097	19	52.69	15.998	40	55.47
			235			313			192			35
28.4	38.27	9	62.46	39.770	79	81.70	39.072	25	54.37	15.989	9	55.97
		18	222	129		262		65	145	56		59
Sept. 7.4	38.09		64.68	39.641		84.32	39.007		55.82	15.933		56.56
			202						116			65
17.4	37.82	27	66.70	39.469	172	86.60	38.908	99	56.98	15.839	94	57.21
						228			90			66
27.3	37.47	35	68.44	39.260	209	88.51	38.779	129	57.88	15.710	129	57.87
Oct. 7.3	37.06	41	69.82	39.024	236	89.99	38.630	149	58.48	15.558	152	58.51
			138			148			60			64
17.3	36.61	45	70.77	38.770	254	91.02	38.467	163	58.79	15.388	170	59.08
		47	48	262		54		166	3	173		49
27.3	36.14		71.25	38.508		91.56	38.301		58.82	15.215		59.57
Nov. 6.2	35.68	46	71.21	38.249	259	91.60	38.140	161	58.55	15.048	167	59.94
			55			46			58			21
16.2	35.24	44	70.66	38.000	249	91.14	37.990	150	57.99	14.894	154	60.15
			105			97			83			9
26.2	34.85	39	69.61	37.772	228	90.17	37.859	131	57.16	14.763	131	60.24
Dec. 6.2	34.52	33	68.10	37.573	199	88.72	37.754	105	56.08	14.661	102	60.19
		25	194	164		188		76	131	67		21
16.1	34.27		66.16	37.409		86.84	37.678		54.77	14.594		59.98
			229			124			149			32
26.1	34.11	16	63.87	37.285	78	84.57	37.633	45	53.28	14.562	32	59.66
		8	259			259		10	163	7		45
36.1	34.03		61.28	37.207		81.98	37.623		51.65	14.569		59.21
Mean Place	29.681		69.90	36.119		59.39	35.044		33.59	11.051		71.19
Sec $\delta$ , Tan $\delta$	2.508		-2.300	1.414		+1.000	1.034		+0.264	1.109		-0.478
$D\psi \alpha$ , $D_w \alpha$	+0.11		+0.10	+0.04		-0.04	+0.06		-0.01	+0.07		+0.02
$D\psi \delta$ , $D_w \delta$	+0.3		-0.8	+0.3		-0.8	+0.3		-0.8	+0.3		-0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Delphini seq. Mag. 4.5		$\varepsilon$ Cygni. Mag. 2.6		$\varepsilon$ Aquarii. Mag. 3.8		$\eta$ Cephei. Mag. 3.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 42	" +15 49	h m 20 42	" +33 39	h m 20 43	" - 9 47	h m 20 43	" +61 30
	s	"	s	"	s	"	s	"
Jan. 1.1	48.119	31.79	50.479	38.22	10.963	62.21	33.96	68.78
	10	172	19	238	29	39	14	289
11.1	48.129	30.07	50.460	35.84	10.992	62.60	33.82	65.92
	43	176	22	251	62	32	7	312
21.0	48.172	28.31	50.482	33.33	11.054	62.92	33.75	62.80
	78	172	63	252	93	23	1	321
31.0	48.250	26.59	50.545	30.81	11.147	63.15	33.76	59.59
	112	160	105	244	126	11	9	318
Feb. 10.0	48.362	24.99	50.650	28.37	11.273	63.26	33.85	56.41
	143	143	145	225	156	4	17	303
19.9	48.505	23.56	50.795	26.12	11.429	63.22	34.02	53.38
	176	115	183	195	183	23	24	277
Mar. 1.9	48.681	22.41	50.978	24.17	11.612	62.99	34.26	50.61
	205	83	220	157	211	41	33	237
11.9	48.886	21.58	51.198	22.60	11.823	62.58	34.59	48.24
	231	5	254	113	235	64	38	187
21.9	49.117	21.11	51.452	21.47	12.058	61.94	34.97	46.37
	257	47	282	63	259	84	44	133
31.8	49.374	21.06	51.734	20.84	12.317	61.10	35.41	45.04
	277	36	307	10	278	105	48	73
Apr. 10.8	49.651	21.42	52.041	20.74	12.595	60.05	35.89	44.31
	293	78	325	44	294	124	50	11
20.8	49.944	22.20	52.366	21.18	12.889	58.81	36.39	44.20
	305	118	336	97	307	139	52	56
30.8	50.249	23.38	52.702	22.15	13.196	57.42	36.91	44.76
	310	153	340	145	312	150	52	115
May 10.7	50.559	24.91	53.042	23.60	13.508	55.92	37.43	45.91
	308	183	336	190	313	158	50	173
20.7	50.867	26.74	53.378	25.50	13.821	54.34	37.93	47.64
	298	210	324	229	305	161	47	225
30.7	51.165	28.84	53.702	27.79	14.126	52.73	38.40	49.89
	284	229	302	261	292	159	43	269
June 9.6	51.449	31.13	54.004	30.40	14.418	51.14	38.83	52.58
	260	242	275	284	271	153	38	306
19.6	51.709	33.55	54.279	33.24	14.689	49.61	39.21	55.64
	232	248	239	303	243	142	31	335
29.6	51.941	36.03	54.518	36.27	14.932	48.19	39.52	58.99
	195	248	198	311	210	129	24	357
July 9.6	52.136	38.51	54.716	39.38	15.142	46.90	39.76	62.56
	155	243	153	313	170	112	17	268
19.5	52.291	40.94	54.869	42.51	15.312	45.78	39.93	66.24
	112	233	104	307	128	94	9	371
29.5	52.403	43.27	54.973	45.58	15.440	44.84	40.02	69.95
	67	217	53	296	82	75	0	367
Aug. 8.5	52.470	45.44	55.026	48.54	15.522	44.09	40.02	73.62
	22	197	3	279	37	57	7	354
18.5	52.492	47.41	55.029	51.33	15.559	43.52	39.95	77.16
	22	174	46	255	8	38	16	335
28.4	52.470	49.15	54.983	53.88	15.551	43.14	39.79	80.51
	63	150	90	228	49	21	22	307
Sept. 7.4	52.407	50.65	54.893	56.16	15.502	42.93	39.57	83.58
	98	122	129	195	86	6	28	276
17.4	52.309	51.87	54.764	58.11	15.416	42.87	39.29	86.34
	128	94	161	160	116	7	33	236
27.3	52.181	52.81	54.603	59.71	15.300	42.94	38.96	88.70
	149	65	185	122	137	17	38	193
Oct. 7.3	52.032	53.46	54.418	60.93	15.163	43.11	38.58	90.63
	163	35	201	81	151	27	41	144
17.3	51.869	53.81	54.217	61.74	15.012	43.38	38.17	92.07
	167	5	207	39	153	32	42	92
27.3	51.702	53.86	54.010	62.13	14.857	43.70	37.75	92.99
	162	25	204	5	150	38	43	38
Nov. 6.2	51.540	53.61	53.806	62.08	14.707	44.08	37.32	93.37
	151	54	194	48	138	41	42	20
16.2	51.389	53.07	53.612	61.60	14.569	44.49	36.90	93.17
	133	83	175	92	117	43	39	76
26.2	51.256	52.24	53.437	60.68	14.452	44.92	36.51	92.41
	108	110	150	133	93	45	36	131
Dec. 6.2	51.148	51.14	53.287	59.35	14.359	45.37	36.15	91.10
	80	132	118	170	61	46	31	184
16.1	51.068	49.82	53.169	57.65	14.298	45.83	35.84	89.26
	49	152	84	203	29	45	26	230
26.1	51.019	48.30	53.085	55.62	14.269	46.28	35.58	86.96
	14	107	46	228	3	42	19	269
36.1	51.005	46.63	53.039	53.34	14.272	46.70	35.39	84.27
Mean Place	48.447	28.19	51.169	31.48	11.054	61.17	36.226	58.03
Sec $\delta$ , Tan $\delta$	1.039	+0.283	1.201	+0.666	1.015	-0.173	2.097	+1.843
$D\psi\alpha$ , $D\omega\alpha$	+0.06	-0.01	+0.05	-0.03	+0.06	+0.01	+0.02	-0.08
$D\psi\delta$ , $D\omega\delta$	+0.3	-0.8	+0.3	-0.8	+0.3	-0.8	+0.3	-0.8



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\mu$ Aquarii. Mag. 4.8		$\beta$ Indi. Mag. 3.7		32 Vulpeculæ. Mag. 5.2		220 H <sup>1</sup> . Draconis. Mag. 5.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 48	° ' " - 9 17	h m 20 48	° ' " - 58 45	h m 20 51	° ' " + 27 44	h m 20 51	° ' " + 80 14
	s	"	s	"	s	"	s	"
Jan. 1.1	10.627	45.05	19.513	72.65	0.827	35.18	15.39	43.46
11.1	10.652	45.46	19.507	70.30	0.811	33.01	14.72	40.73
21.0	10.709	45.80	19.569	67.76	0.833	30.76	14.27	37.70
31.0	10.797	46.04	19.698	65.10	0.893	28.49	14.06	34.49
Feb. 10.0	10.918	46.17	19.893	62.37	0.989	26.31	14.09	31.24
20.0	11.069	46.15	20.147	59.65	1.123	24.31	14.38	28.05
Mar. 1.9	11.247	45.93	20.458	56.97	1.294	22.59	14.90	25.09
11.9	11.454	45.53	20.820	54.41	1.499	21.21	15.64	22.42
21.9	11.685	44.90	21.228	52.00	1.735	20.25	16.56	20.21
31.8	11.940	44.06	21.677	49.78	2.001	19.76	17.64	18.50
Apr. 10.8	12.215	43.01	22.160	47.81	2.290	19.78	18.85	17.37
20.8	12.507	41.77	22.670	46.10	2.599	20.28	20.13	16.88
30.8	12.812	40.37	23.198	44.71	2.920	21.27	21.43	16.97
May 10.7	13.123	38.85	23.735	43.68	3.246	22.70	22.73	17.72
20.7	13.435	37.24	24.271	43.01	3.571	24.55	23.97	19.07
30.7	13.741	35.61	24.794	42.72	3.887	26.76	25.12	20.95
June 9.7	14.035	33.99	25.292	42.82	4.185	29.25	26.15	23.32
19.6	14.309	32.42	25.753	43.30	4.459	31.95	27.03	26.10
29.6	14.555	30.95	26.167	44.16	4.700	34.79	27.72	29.23
July 9.6	14.767	29.62	26.522	45.36	4.903	37.71	28.23	32.63
19.5	14.942	28.46	26.808	46.85	5.064	40.63	28.53	36.21
29.5	15.074	27.47	27.020	48.61	5.179	43.49	28.63	39.89
Aug. 8.5	15.161	26.67	27.149	50.54	5.245	46.23	28.51	43.61
18.5	15.203	26.07	27.195	52.59	5.264	48.78	28.18	47.24
28.4	15.201	25.65	27.159	54.69	5.236	51.12	27.66	50.73
Sept. 7.4	15.156	25.42	27.046	56.73	5.165	53.19	26.94	54.01
17.4	15.074	25.34	26.860	58.64	5.056	54.96	26.07	57.04
27.4	14.961	25.39	26.614	60.33	4.916	56.40	25.04	59.71
Oct. 7.3	14.827	25.55	26.320	61.74	4.751	57.49	23.88	61.99
17.3	14.679	25.82	25.995	62.78	4.571	58.20	22.64	63.82
27.3	14.525	26.15	25.654	63.42	4.384	58.53	21.33	65.14
Nov. 6.2	14.375	26.53	25.315	63.60	4.199	58.47	19.98	65.89
16.2	14.237	26.95	24.994	63.34	4.023	58.02	18.64	66.09
26.2	14.118	27.41	24.706	62.62	3.865	57.18	17.33	65.69
Dec. 6.2	14.023	27.88	24.464	61.46	3.728	55.97	16.09	64.72
16.1	13.958	28.35	24.279	59.91	3.621	54.42	14.98	63.19
26.1	13.925	28.81	24.156	58.01	3.546	52.59	14.00	61.14
36.1	13.924	29.25	24.100	55.81	3.505	50.52	13.21	58.62
Mean Place	10.706	44.18	19.977	64.98	1.338	28.91	23.721	30.34
Sec $\delta$ , Tan $\delta$	1.013	-0.164	1.929	-1.649	1.130	+0.526	5.902	+5.817
$D\psi\alpha$ , $D\omega\alpha$	+0.06	+0.01	+0.09	+0.07	+0.05	-0.02	-0.05	-0.28
$D\psi\delta$ , $D\omega\delta$	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

## APPARENT PLACES OF STARS, 1917.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Cygni. Mag. 4.0		$\alpha$ Octantis. Mag. 5.2		$\gamma$ Microscopii. Mag. 4.7		$\theta$ Capricorni. Mag. 4.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 20 54	° ' " +40 50	h m 20 54	° ' " -77 20	h m 20 56	° ' " -32 34	h m 21 1	° ' " -17 33
	s	"	s	"	s	"	s	"
Jan. 1.1	3.822	57.96	40.26	40.25	12.222	63.38	16.993	50.79
11.1	3.771	55.42	40.08	37.15	12.239	62.45	17.007	50.72
21.0	3.766	52.73	40.07	33.84	12.294	61.37	17.053	50.55
31.0	3.806	49.98	40.24	30.43	12.387	60.14	17.134	50.25
Feb. 10.0	3.893	47.28	40.56	26.98	12.519	58.80	17.247	49.83
20.0	4.026	44.75	41.04	23.58	12.685	57.36	17.390	49.26
Mar. 1.9	4.204	42.49	41.67	20.32	12.885	55.84	17.563	48.54
11.9	4.424	40.59	42.42	17.26	13.116	54.24	17.766	47.67
21.9	4.684	39.14	43.29	14.46	13.377	52.59	17.995	46.64
31.9	4.979	38.22	44.25	11.97	13.664	50.93	18.250	45.44
Apr. 10.8	5.302	37.84	45.30	9.84	13.976	49.27	18.527	44.12
20.8	5.647	38.03	46.40	8.11	14.308	47.66	18.824	42.69
30.8	6.005	38.78	47.54	6.83	14.656	46.11	19.136	41.18
May 10.7	6.369	40.07	48.70	6.00	15.012	44.67	19.457	39.63
20.7	6.730	41.86	49.84	5.65	15.370	43.38	19.781	38.08
30.7	7.078	44.08	50.96	5.78	15.723	42.28	20.101	36.57
June 9.7	7.405	46.68	52.02	6.39	16.064	41.38	20.410	35.14
19.6	7.701	49.57	52.98	7.45	16.384	40.72	20.701	33.84
29.6	7.960	52.69	53.84	8.94	16.674	40.31	20.965	32.71
July 9.6	8.175	55.95	54.57	10.82	16.926	40.16	21.198	31.75
19.5	8.341	59.27	55.15	13.02	17.136	40.26	21.392	31.01
29.5	8.455	62.58	55.56	15.47	17.298	40.61	21.543	30.46
Aug. 8.5	8.514	65.80	55.79	18.10	17.408	41.18	21.647	30.12
18.5	8.520	68.87	55.83	20.82	17.465	41.93	21.704	30.00
28.4	8.473	71.73	55.70	23.51	17.470	42.80	21.715	30.04
Sept. 7.4	8.377	74.32	55.38	26.09	17.425	43.76	21.682	30.25
17.4	8.238	76.59	54.88	28.47	17.334	44.76	21.608	30.57
27.4	8.063	78.52	54.25	30.52	17.206	45.75	21.501	30.99
Oct. 7.3	7.860	80.03	53.50	32.17	17.048	46.66	21.370	31.46
17.3	7.638	81.11	52.66	33.34	16.872	47.45	21.222	31.95
27.3	7.405	81.74	51.76	33.98	16.687	48.07	21.065	32.43
Nov. 6.2	7.172	81.90	50.86	34.07	16.504	48.51	20.909	32.88
16.2	6.948	81.57	49.98	33.54	16.334	48.73	20.764	33.28
26.2	6.741	80.76	49.16	32.44	16.183	48.73	20.637	33.61
Dec. 6.2	6.556	79.49	48.43	30.79	16.061	48.51	20.533	33.86
16.1	6.402	77.79	47.83	28.64	15.972	48.08	20.458	34.04
26.1	6.285	75.71	47.39	26.07	15.920	47.43	20.414	34.13
36.1	6.207	73.33	47.09	23.15	15.907	46.63	20.403	34.13
Mean Place	4.689	49.17	42.416	31.45	12.259	58.56	17.001	48.54
Sec $\delta$ , Tan $\delta$	1.322	+0.865	4.563	-4.452	1.187	-0.639	1.049	-0.316
$\Delta \alpha$ $\Delta \alpha$	+0.04	-0.04	+0.15	+0.20	+0.07	+0.03	+0.07	+0.02
$\delta$	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Cygni. Mag. 3.9		61 Cygni <i>pr.</i> Mag. 5.6		$\nu$ Aquarii. Mag. 4.5		Bradley 2777. Mag. 5.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	21 1	+43 35	21 3	+38 20	21 5	-11 42	21 7	+77 47
	s	"	s	"	s	"	s	"
Jan. 1.1	53.744	56.51	9.717	34.95	4.434	31.09	5.06	38.68
11.1	53.678	53.98	9.679	32.63	4.444	31.33	4.49	36.06
21.0	53.656	51.26	9.683	30.14	4.485	31.51	4.09	33.10
31.0	53.683	48.46	9.729	27.59	4.558	31.58	3.88	29.93
Feb. 10.0	53.758	45.69	9.820	25.09	4.663	31.52	3.85	26.67
20.0	53.882	43.06	9.955	22.74	4.797	31.29	4.03	23.45
Mar. 1.9	54.054	40.68	10.133	20.67	4.961	30.91	4.40	20.41
11.9	54.271	38.66	10.353	18.95	5.154	30.33	4.94	17.66
21.9	54.532	37.09	10.611	17.66	5.374	29.54	5.65	15.31
31.9	54.830	36.02	10.902	16.88	5.619	28.56	6.49	13.47
Apr. 10.8	55.158	35.50	11.224	16.63	5.889	27.38	7.44	12.18
20.8	55.512	35.57	11.567	16.93	6.177	26.04	8.46	11.50
30.8	55.881	36.20	11.926	17.78	6.481	24.55	9.52	11.46
May 10.7	56.257	37.38	12.291	19.16	6.794	22.97	10.58	12.03
20.7	56.631	39.08	12.655	21.02	7.112	21.32	11.62	13.21
30.7	56.994	41.24	13.007	23.31	7.426	19.67	12.60	14.95
June 9.7	57.334	43.80	13.341	25.96	7.728	18.07	13.50	17.20
19.6	57.644	46.67	13.647	28.91	8.014	16.53	14.28	19.90
29.6	57.917	49.80	13.917	32.06	8.274	15.11	14.92	22.97
July 9.6	58.146	53.11	14.146	35.34	8.502	13.84	15.42	26.32
19.6	58.323	56.48	14.328	38.69	8.694	12.76	15.76	29.89
29.5	58.447	59.87	14.458	42.02	8.843	11.87	15.92	33.59
Aug. 8.5	58.515	63.19	14.537	45.26	8.947	11.18	15.93	37.34
18.5	58.526	66.38	14.564	48.35	9.005	10.69	15.77	41.05
28.4	58.483	69.36	14.539	51.23	9.018	10.41	15.43	44.65
Sept. 7.4	58.389	72.10	14.466	53.85	8.988	10.29	14.95	48.06
17.4	58.250	74.52	14.351	56.16	8.919	10.33	14.33	51.22
27.4	58.072	76.58	14.202	58.11	8.819	10.50	13.57	54.06
Oct. 7.3	57.863	78.24	14.023	59.68	8.693	10.78	12.72	56.51
17.3	57.634	79.47	13.826	60.83	8.551	11.13	11.78	58.52
27.3	57.392	80.24	13.618	61.54	8.401	11.52	10.78	60.04
Nov. 6.3	57.147	80.53	13.409	61.79	8.251	11.95	9.74	61.01
16.2	56.909	80.31	13.207	61.58	8.111	12.39	8.69	61.41
26.2	56.685	79.60	13.020	60.91	7.988	12.82	7.66	61.22
Dec. 6.2	56.485	78.41	12.856	59.79	7.886	13.24	6.68	60.44
16.1	56.314	76.77	12.720	58.26	7.811	13.63	5.78	59.07
26.1	56.179	74.73	12.617	56.37	7.765	13.99	4.99	57.17
36.1	56.082	72.37	12.552	54.17	7.750	14.29	4.33	54.79
Mean Place	54.674	46.67	10.466	26.13	4.447	30.02	11.200	24.11
Sec $\delta$ , Tan $\delta$	1.381	+0.952	1.275	+0.791	1.021	-0.207	4.730	+4.623
$D\psi a$ , $D\omega a$	+0.04	-0.05	+0.05	-0.04	+0.06	+0.01	-0.02	-0.22
$D\psi \delta$ , $D\omega \delta$	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	3 Piscis Australis. Mag. 5.6		♄ Cygni. Mag. 3.4		τ Cygni. Mag. 3.8		α Equulei. Mag. 4.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 8	° ' " -27 57	h m 21 9	° ' " +29 53	h m 21 11	° ' " +37 41	h m 21 11	° ' " +4 54
	s	"	s	"	s	"	s	"
Jan. 1.1	22.226	34.99	23.696	16.89	27.964	35.61	40.409	17.22
11.1	22.230	34.33	23.660	14.77	27.908	33.30	40.404	16.12
21.1	22.271	33.53	23.659	12.50	27.891	30.81	40.430	15.01
31.0	22.349	32.58	23.697	10.19	27.915	28.24	40.487	13.96
Feb. 10.0	22.462	31.50	23.773	7.94	27.984	25.70	40.575	13.01
20.0	22.607	30.28	23.887	5.85	28.097	23.29	40.694	12.24
Mar. 1.9	22.786	28.94	24.040	4.00	28.251	21.12	40.843	11.68
11.9	22.995	27.51	24.229	2.48	28.448	19.30	41.023	11.39
21.9	23.234	25.99	24.454	1.37	28.684	17.88	41.231	11.39
31.9	23.502	24.40	24.711	0.72	28.956	16.96	41.465	11.72
Apr. 10.8	23.793	22.76	24.994	0.55	29.259	16.56	41.724	12.37
20.8	24.107	21.11	25.301	0.89	29.586	16.68	42.002	13.34
30.8	24.436	19.49	25.624	1.73	29.930	17.36	42.297	14.62
May 10.8	24.777	17.93	25.956	3.04	30.284	18.55	42.603	16.16
20.7	25.123	16.47	26.290	4.78	30.639	20.24	42.913	17.92
30.7	25.466	15.16	26.617	6.90	30.985	22.35	43.218	19.85
June 9.7	25.799	14.03	26.928	9.32	31.315	24.85	43.514	21.89
19.6	26.112	13.09	27.218	12.01	31.620	27.62	43.792	24.00
29.6	26.401	12.39	27.477	14.86	31.891	30.64	44.045	26.09
July 9.6	26.654	11.93	27.699	17.82	32.122	33.79	44.267	28.15
19.6	26.868	11.73	27.879	20.81	32.308	37.02	44.453	30.11
29.5	27.036	11.76	28.013	23.76	32.445	40.26	44.598	31.94
Aug. 8.5	27.155	12.03	28.100	26.62	32.529	43.43	44.699	33.58
18.5	27.223	12.50	28.137	29.33	32.562	46.45	44.756	35.04
28.4	27.241	13.13	28.126	31.82	32.544	49.28	44.769	36.28
Sept. 7.4	27.211	13.90	28.071	34.06	32.477	51.86	44.740	37.31
17.4	27.137	14.74	27.977	36.02	32.368	54.16	44.674	38.10
27.4	27.025	15.60	27.848	37.65	32.222	56.10	44.577	38.68
Oct. 7.3	26.885	16.44	27.692	38.92	32.046	57.67	44.455	39.03
17.3	26.724	17.20	27.518	39.84	31.850	58.84	44.317	39.16
27.3	26.554	17.86	27.334	40.36	31.641	59.58	44.171	39.10
Nov. 6.3	26.383	18.38	27.147	40.47	31.429	59.87	44.023	38.83
16.2	26.221	18.74	26.966	40.18	31.221	59.69	43.881	38.39
26.2	26.078	18.91	26.800	39.48	31.026	59.06	43.757	37.77
Dec. 6.2	25.959	18.90	26.652	38.39	30.852	57.98	43.651	36.99
16.1	25.868	18.70	26.530	36.96	30.702	56.48	43.568	36.08
26.1	25.812	18.33	26.436	35.20	30.585	54.62	43.513	35.06
36.1	25.792	17.79	26.376	33.18	30.502	52.45	43.486	33.97
Mean Place	22.207	30.84	24.176	9.03	28.636	26.11	40.506	14.60
Sec δ, Tan δ	1.132	-0.531	1.153	+0.575	1.264	+0.773	1.004	+0.066
D $\psi$ $\alpha$ , D $\omega$ $\alpha$	+0.07	+0.03	+0.05	-0.03	+0.05	-0.04	+0.06	0.00
D $\psi$ $\delta$ , D $\omega$ $\delta$	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\sigma$ Cygni. Mag. 4.3		$\theta^1$ Microscopii. Mag. 4.9		$\alpha$ Cephei. Mag. 2.6		$\epsilon$ Capricorni. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 14 s	° ' " +39 2	h m 21 15 s	° ' " -41 9	h m 21 16 s	° ' " +62 13	h m 21 17 s	° ' " -17 10
Jan. 1.1	8.600	57.08	27.274	46.43	33.96	74.84	37.699	81.38
11.1	8.536	54.74	27.260	45.07	33.76	72.21	37.697	81.33
21.1	8.513	52.20	27.290	43.49	33.63	69.29	37.728	81.15
31.0	8.533	49.58	27.362	41.74	33.58	66.17	37.791	80.85
Feb. 10.0	8.596	46.98	27.476	39.85	33.60	63.00	37.885	80.42
20.0	8.704	44.50	27.630	37.87	33.71	59.90	38.011	79.84
Mar. 1.9	8.857	42.27	27.824	35.80	33.90	56.97	38.167	79.08
11.9	9.054	40.36	28.053	33.70	34.17	54.37	38.353	78.17
21.9	9.289	38.88	28.319	31.59	34.51	52.19	38.568	77.08
31.9	9.562	37.88	28.618	29.52	34.92	50.51	38.809	75.84
Apr. 10.8	9.868	37.40	28.945	27.52	35.38	49.39	39.077	74.45
20.8	10.198	37.46	29.298	25.62	35.88	48.89	39.365	72.95
30.8	10.547	38.08	29.670	23.88	36.40	49.00	39.672	71.36
May 10.8	10.905	39.23	30.057	22.33	36.94	49.73	39.989	69.71
20.7	11.265	40.87	30.449	20.99	37.47	51.06	40.313	68.07
30.7	11.616	42.95	30.840	19.92	37.98	52.94	40.636	66.47
June 9.7	11.950	45.42	31.220	19.14	38.46	55.31	40.951	64.95
19.6	12.260	48.19	31.579	18.66	38.90	58.09	41.249	63.55
29.6	12.537	51.20	31.910	18.51	39.28	61.23	41.524	62.33
July 9.6	12.772	54.37	32.203	18.67	39.59	64.63	41.767	61.28
19.6	12.962	57.62	32.451	19.13	39.82	68.22	41.974	60.44
29.5	13.101	60.89	32.648	19.88	39.97	71.92	42.139	59.83
Aug. 8.5	13.188	64.09	32.787	20.87	40.05	75.63	42.259	59.43
18.5	13.222	67.16	32.868	22.07	40.05	79.29	42.332	59.25
28.5	13.204	70.05	32.892	23.40	39.96	82.80	42.358	59.27
Sept. 7.4	13.138	72.68	32.857	24.83	39.80	86.12	42.339	59.46
17.4	13.028	75.02	32.772	26.28	39.57	89.15	42.280	59.79
27.4	12.880	77.03	32.641	27.67	39.28	91.84	42.187	60.22
Oct. 7.3	12.702	78.65	32.473	28.94	38.95	94.14	42.065	60.72
17.3	12.502	79.87	32.281	30.02	38.57	96.00	41.925	61.25
27.3	12.288	80.65	32.074	30.89	38.16	97.35	41.774	61.78
Nov. 6.3	12.071	80.98	31.864	31.47	37.75	98.18	41.622	62.29
16.2	11.859	80.84	31.660	31.74	37.33	98.44	41.476	62.75
26.2	11.657	80.23	31.475	31.71	36.92	98.12	41.345	63.14
Dec. 6.2	11.475	79.17	31.317	31.35	36.53	97.24	41.236	63.45
16.2	11.319	77.68	31.193	30.68	36.18	95.79	41.151	63.66
26.1	11.194	75.82	31.107	29.73	35.88	93.83	41.095	63.79
36.1	11.104	73.61	31.064	28.52	35.63	91.44	41.070	63.82
Mean Place	9.301	47.12	27.288	40.04	36.023	60.93	37.651	79.32
Sec $\delta$ , Tan $\delta$	1.288	+0.811	1.328	-0.874	2.147	+1.900	1.047	-0.309
$D\phi\alpha$ , $D_\alpha\alpha$	+0.05	-0.04	+0.08	+0.04	+0.03	-0.10	+0.07	+0.02
$D\phi\delta$ , $D_\alpha\delta$	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7	+0.3	-0.7

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	1 Pegasi. Mag. 4.2		γ Pavonis. Mag. 4.3		ζ Capricorni. Mag. 3.9		γ Cygni. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 18	° ' " +19 26	h m 21 19	° ' " -65 44	h m 21 21	° ' " -22 45	h m 21 26	° ' " +46 10
	s	"	s	"	s	"	s	"
Jan. 1.1	14.619	61.83	35.29	43.53	55.965	80.58	22.255	39.31
11.1	14.593	60.13	35.18	40.96	55.958	80.23	22.154	36.92
21.1	14.599	58.34	35.15	38.13	55.985	79.73	22.096	34.29
31.0	14.639	56.53	35.21	35.10	56.045	79.08	22.086	31.51
Feb. 10.0	14.712	54.80	35.36	31.97	56.136	78.29	22.127	28.70
20.0	14.820	53.23	35.59	28.80	56.261	77.35	22.218	25.99
Mar. 1.9	14.961	51.88	35.89	25.65	56.418	76.27	22.362	23.49
11.9	15.136	50.84	36.26	22.60	56.605	75.03	22.558	21.29
21.9	15.343	50.16	36.69	19.68	56.823	73.67	22.800	19.49
31.9	15.579	49.88	37.19	16.99	57.070	72.19	23.087	18.17
Apr. 10.8	15.843	50.03	37.73	14.55	57.341	70.61	23.410	17.38
20.8	16.129	50.61	38.32	12.42	57.637	68.95	23.765	17.15
30.8	16.433	51.61	38.95	10.65	57.951	67.27	24.142	17.51
May 10.8	16.747	52.99	39.59	9.25	58.277	65.60	24.532	18.43
20.7	17.066	54.74	40.24	8.28	58.611	63.99	24.926	19.88
30.7	17.381	56.79	40.89	7.74	58.945	62.47	25.311	21.83
June 9.7	17.684	59.07	41.51	7.66	59.271	61.07	25.680	24.20
19.6	17.969	61.53	42.09	8.02	59.580	59.86	26.021	26.95
29.6	18.228	64.12	42.63	8.81	59.867	58.84	26.327	29.98
July 9.6	18.454	66.75	43.10	10.01	60.121	58.06	26.589	33.23
19.6	18.642	69.36	43.50	11.58	60.338	57.50	26.802	36.62
29.5	18.788	71.89	43.81	13.46	60.512	57.20	26.961	40.06
Aug. 8.5	18.889	74.31	44.02	15.60	60.640	57.12	27.062	43.48
18.5	18.944	76.56	44.12	17.89	60.719	57.28	27.105	46.82
28.5	18.954	78.59	44.13	20.28	60.750	57.61	27.091	49.99
Sept. 7.4	18.921	80.39	44.04	22.66	60.734	58.10	27.023	52.94
17.4	18.850	81.92	43.85	24.94	60.676	58.72	26.906	55.61
27.4	18.747	83.16	43.58	27.01	60.581	59.40	26.747	57.96
Oct. 7.3	18.617	84.11	43.23	28.79	60.456	60.13	26.552	59.91
17.3	18.469	84.74	42.83	30.22	60.312	60.83	26.330	61.46
27.3	18.311	85.05	42.40	31.20	60.156	61.48	26.090	62.55
Nov. 6.3	18.150	85.05	41.95	31.69	59.997	62.05	25.842	63.15
16.2	17.995	84.71	41.51	31.66	59.844	62.51	25.594	63.26
26.2	17.851	84.07	41.10	31.11	59.705	62.84	25.354	62.85
Dec. 6.2	17.726	83.14	40.73	30.05	59.588	63.02	25.133	61.94
16.2	17.622	81.92	40.42	28.51	59.496	63.06	24.935	60.55
26.1	17.546	80.48	40.18	26.53	59.434	62.96	24.769	58.73
36.1	17.498	78.84	40.01	24.18	59.404	62.70	24.640	56.51
Mean Place	14.864	55.70	35.870	34.26	55.893	77.40	23.141	27.13
Sec δ, Tan δ	1.061	+0.353	2.434	-2.219	1.084	-0.420	1.444	+1.042
Dψ α, Dω α	+0.05	-0.02	+0.10	+0.11	+0.07	+0.02	+0.04	-0.05
Dψ δ, Dω δ	+0.3	-0.6	+0.3	-0.6	+0.3	-0.6	+0.3	-0.6

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\beta$ Aquarii. Mag. 3.1		$\beta$ Cephei. Mag. 3.3		$\xi$ Aquarii. Mag. 4.8		74 Cygni. Mag. 5.1	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 27 s	° ' " - 5 55 "	h m 21 27 s	° ' " +70 11 "	h m 21 33 s	° ' " - 8 13 "	h m 21 33 s	° ' " +40 2 "
Jan. 1.1	11.484	72.54	32.60	62.04	20.166	37.15	36.673	36.04
11.1	11.472	73.08	32.25	59.53	20.150	37.56	36.588	33.81
21.1	11.490	73.56	32.01	56.68	20.165	37.90	36.541	31.36
31.0	11.537	73.94	31.86	53.58	20.207	38.12	36.536	28.77
Feb. 10.0	11.615	74.18	31.82	50.36	20.281	38.22	36.574	26.19
20.0	11.724	74.28	31.91	47.15	20.385	38.16	36.658	23.68
Mar. 2.0	11.862	74.18	32.12	44.09	20.518	37.90	36.789	21.37
11.9	12.031	73.85	32.43	41.29	20.683	37.44	36.964	19.37
21.9	12.229	73.30	32.85	38.88	20.876	36.75	37.183	17.76
31.9	12.454	72.49	33.36	36.94	21.099	35.84	37.443	16.60
Apr. 10.8	12.706	71.45	33.95	35.54	21.348	34.70	37.739	15.94
20.8	12.980	70.18	34.60	34.74	21.620	33.36	38.064	15.83
30.8	13.272	68.72	35.30	34.57	21.911	31.85	38.412	16.26
May 10.8	13.579	67.08	36.00	35.02	22.218	30.19	38.774	17.24
20.7	13.891	65.34	36.69	36.07	22.532	28.44	39.141	18.71
30.7	14.204	63.53	37.37	37.71	22.847	26.63	39.505	20.64
June 9.7	14.509	61.69	38.00	39.86	23.155	24.83	39.854	22.97
19.7	14.800	59.88	38.57	42.47	23.451	23.08	40.182	25.64
29.6	15.068	58.15	39.06	45.48	23.725	21.43	40.478	28.57
July 9.6	15.308	56.55	39.47	48.79	23.970	19.90	40.735	31.70
19.6	15.512	55.09	39.79	52.34	24.181	18.54	40.949	34.94
29.5	15.677	53.81	39.99	56.04	24.353	17.38	41.113	38.22
Aug. 8.5	15.798	52.75	40.09	59.80	24.482	16.42	41.225	41.47
18.5	15.875	51.88	40.08	63.56	24.565	15.69	41.284	44.61
28.5	15.907	51.24	39.97	67.22	24.604	15.16	41.290	47.60
Sept. 7.4	15.896	50.79	39.75	70.72	24.600	14.85	41.246	50.37
17.4	15.847	50.54	39.44	73.98	24.558	14.72	41.157	52.86
27.4	15.764	50.46	39.05	76.93	24.480	14.75	41.027	55.03
Oct. 7.4	15.653	50.54	38.59	79.51	24.375	14.93	40.864	56.84
17.3	15.525	50.75	38.06	81.65	24.248	15.22	40.677	58.27
27.3	15.385	51.06	37.50	83.32	24.110	15.60	40.473	59.26
Nov. 6.3	15.243	51.46	36.91	84.45	23.969	16.05	40.261	59.80
16.2	15.105	51.93	36.30	85.02	23.831	16.54	40.048	59.87
26.2	14.979	52.46	35.70	84.99	23.704	17.05	39.843	59.47
Dec. 6.2	14.871	53.02	35.12	84.37	23.594	17.58	39.653	58.61
16.2	14.785	53.60	34.59	83.17	23.505	18.10	39.485	57.30
26.1	14.725	54.19	34.11	81.41	23.442	18.60	39.342	55.58
36.1	14.693	54.76	33.70	79.16	23.405	19.07	39.233	53.51
Mean Place	11.442	73.11	35.732	46.22	20.090	37.29	37.291	24.51
Sec $\delta$ , Tan $\delta$	1.005	-0.104	2.952	+2.778	1.010	-0.145	1.306	+0.840
$D\psi\alpha$ , $D\omega\alpha$	+0.06	+0.01	+0.02	-0.15	+0.06	+0.01	+0.05	-0.04
$D\psi\delta$ , $D\omega\delta$	+0.3	-0.6	+0.3	-0.6	+0.3	-0.6	+0.3	-0.8

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Capricorni. Mag. 3.8			ε Pegasi. Mag. 2.5			11 Cephei. Mag. 4.8			δ Capricorni. Mag. 3.0		
	Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.		Right Ascension.	Declina- tion.	
	h m	° '		h m	° '		h m	° '		h m	° '	
	21 35	-17 1		21 40	+ 9 29		21 40	+70 55		21 42	-16 29	
	s	"		s	"		s	"		s	"	
Jan. 1.1	29.794	77.78		6.527	42.70		39.54	61.52		27.841	77.97	
11.1	29.776	77.74		6.497	41.47	123	39.14	59.17	235	27.818	77.97	0
21.1	29.789	77.56		6.493	40.22	125	38.86	56.43	274	27.824	77.85	12
31.0	29.833	77.26	30	6.520	38.99	123	38.67	53.41	302	27.861	77.57	28
Feb. 10.0	29.908	76.81	45	6.578	37.85	114	38.59	50.24	317	27.929	77.15	42
	107	62		87	100		5	320		97	58	
20.0	30.015	76.19		6.665	36.85	79	38.64	47.04	309	28.026	76.56	77
Mar. 2.0	30.152	75.40	79	6.786	36.06	54	38.82	43.95	286	28.156	75.79	94
11.9	30.320	74.44	96	6.939	35.52	22	39.11	41.09	251	28.317	74.85	113
21.9	30.519	73.29	115	7.123	35.30	11	39.51	38.58	207	28.508	73.72	130
31.9	30.746	71.99	130	7.338	35.41	46	40.01	36.51	155	28.730	72.42	145
	256	144		242	195		59	146		250	173	
Apr. 10.9	31.002	70.55		7.580	35.87	81	40.60	34.96	96	28.980	70.97	159
20.8	31.280	68.97	158	7.849	36.68	65	41.25	34.00	36	29.255	69.38	169
30.8	31.581	67.28	169	8.137	37.83	115	41.96	33.64	29	29.551	67.69	175
May 10.8	31.895	65.57	171	8.441	39.29	146	42.69	33.89	25	29.864	65.94	176
20.7	32.217	63.83	174	8.752	41.02	173	43.41	34.78	89	30.187	64.18	173
	322	170		313	196		72	146		325	164	
30.7	32.543	62.13		9.065	42.97	212	44.11	36.24	200	30.512	62.45	154
June 9.7	32.862	60.53	160	9.371	45.09	67	44.78	38.24	248	30.833	60.81	137
19.7	33.168	59.04	149	9.663	47.31	52	45.40	40.72	290	31.141	59.27	118
29.6	33.453	57.72	132	9.934	49.58	227	45.94	43.62	320	31.430	57.90	95
July 9.6	33.710	56.59	113	10.176	51.84	226	46.40	46.82	349	31.690	56.72	71
	221	91		208	221		36	349		226	50	
19.6	33.931	55.68		10.384	54.05	209	46.76	50.31	367	31.916	55.77	24
29.6	34.112	55.00	68	10.553	56.14	195	47.00	53.98	376	32.103	55.06	17
Aug. 8.5	34.249	54.55	45	10.679	58.09	176	47.14	57.74	378	32.246	54.56	33
18.5	34.339	54.34	21	10.761	59.85	150	47.18	61.52	372	32.343	54.32	55
28.5	34.383	54.34	0	10.799	61.41	133	47.10	65.24	357	32.393	54.28	61
	1	19		3	108		18	357		5	45	
Sept. 7.4	34.382	54.53		10.796	62.74	108	46.92	68.81	338	32.398	54.45	33
17.4	34.339	54.87	34	10.753	63.82	85	46.63	72.19	308	32.362	54.78	45
27.4	34.260	55.33	46	10.676	64.67	60	46.26	75.27	272	32.289	55.23	55
Oct. 7.4	34.150	55.87	54	10.573	65.27	36	45.81	77.99	232	32.185	55.78	60
17.3	34.020	56.46	59	10.448	65.63	11	45.30	80.31	185	32.059	56.38	61
	143	60		137	11		57	185		139	60	
27.3	33.877	57.06		10.311	65.74	11	44.73	82.16	134	31.920	56.99	55
Nov. 6.3	33.729	57.63	57	10.169	65.63	35	44.13	83.50	78	31.775	57.59	41
16.3	33.585	58.15	52	10.029	65.28	55	43.51	84.28	18	31.633	58.14	31
26.2	33.451	58.61	46	9.898	64.73	75	42.89	84.46	42	31.500	58.63	20
Dec. 6.2	33.336	58.98	37	9.781	63.98	92	42.29	84.04	102	31.383	59.04	9
	93	25		99	108		57	157		96	20	
16.2	33.243	59.23		9.682	63.06	119	41.72	83.02	209	31.287	59.35	
26.1	33.176	59.39	16	9.607	61.98	45	41.21	81.45	45	31.216	59.55	
36.1	33.138	59.45	6	9.556	60.79		40.76	79.36		31.171	59.64	
Mean Place	29.676	75.90		6.553	37.98		42.615	44.50		27.698	76.26	
Sec δ, Tan δ	1.046	-0.306		1.014	+0.167		3.061	+2.893		1.043	-0.296	
Dψ α, Dα α	+0.07	+0.02		+0.06	-0.01		+0.02	-0.16		+0.06	+0.02	
Dψ δ, Dα δ	+0.3	-0.6		+0.3	-0.6		+0.3	-0.6		+0.3	-0.6	

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\pi^2$ Cygni. Mag. 4.3		$\mu$ Capricorni. Mag. 5.2		$\gamma$ Gruis. Mag. 3.2		16 Pegasi. Mag. 5.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 43	° ' " +48 55	h m 21 48	° ' " -13 56	h m 21 48	° ' " -37 44	h m 21 49	° ' " +25 31
Jan. 1.1	42.658 133	44.43 229	46.502 27	36.44 12	54.568 48	87.48 107	16.890 60	72.39 176
11.1	42.525 89	42.14 258	46.475 0	36.56 1	54.520 10	86.41 132	16.830 30	70.63 190
21.1	42.436 40	39.56 276	46.475 31	36.57 12	54.510 27	85.09 154	16.800 1	68.73 197
31.0	42.396 12	36.80 284	46.506 60	36.45 29	54.537 66	83.55 173	16.801 37	66.76 196
Feb. 10.0	42.408 66	33.96 280	46.566 90	36.16 45	54.603 104	81.82 189	16.838 72	64.80 185
20.0	42.474 123	31.16 263	46.656 122	35.71 64	54.707 141	79.93 202	16.910 110	62.95 166
Mar. 2.0	42.597 178	28.53 237	46.778 153	35.07 82	54.848 179	77.91 212	17.020 147	61.29 140
11.9	42.775 231	26.16 199	46.931 183	34.25 101	55.027 217	75.79 218	17.167 183	59.89 104
21.9	43.006 280	24.17 153	47.114 215	33.24 122	55.244 252	73.61 221	17.350 219	58.85 64
31.9	43.286 324	22.64 102	47.329 242	32.02 139	55.496 285	71.40 219	17.569 252	58.21 22
Apr. 10.9	43.610 361	21.62 45	47.571 269	30.63 154	55.781 315	69.21 212	17.821 280	57.99 25
20.8	43.971 387	21.17 12	47.840 290	29.09 168	56.096 340	67.09 204	18.101 304	58.24 71
30.8	44.358 406	21.29 69	48.130 308	27.41 175	56.436 361	65.05 189	18.405 319	58.95 114
May 10.8	44.764 412	21.98 124	48.438 319	25.66 180	56.797 373	63.16 169	18.724 329	60.09 155
20.7	45.176 409	23.22 176	48.757 322	23.86 179	57.170 378	61.47 147	19.053 331	61.64 190
30.7	45.585 393	24.98 222	49.079 318	22.07 174	57.548 374	60.00 119	19.384 324	63.54 223
June 9.7	45.978 369	27.20 262	49.397 307	20.33 164	57.922 362	58.81 90	19.708 307	65.77 246
19.7	46.347 333	29.82 295	49.704 289	18.69 151	58.284 339	57.91 57	20.015 285	68.23 265
29.6	46.680 291	32.77 319	49.993 261	17.18 132	58.623 308	57.34 24	20.300 255	70.88 276
July 9.6	46.971 241	35.96 337	50.254 229	15.86 111	58.931 269	57.10 9	20.555 218	73.64 280
19.6	47.212 184	39.33 346	50.483 190	14.75 90	59.200 223	57.19 41	20.773 176	76.44 279
29.6	47.396 127	42.79 349	50.673 147	13.85 66	59.423 172	57.60 70	20.949 132	79.23 272
Aug. 8.5	47.523 68	46.28 344	50.820 102	13.19 42	59.595 118	58.30 95	21.081 85	81.95 257
18.5	47.591 8	49.72 331	50.922 56	12.77 19	59.713 62	59.25 118	21.166 39	84.52 242
28.5	47.599 50	53.03 311	50.978 12	12.58 0	59.775 6	60.43 131	21.205 6	86.94 218
Sept. 7.4	47.549 102	56.14 287	50.990 30	12.58 19	59.781 45	61.74 141	21.199 46	89.12 193
17.4	47.447 148	59.01 256	50.960 68	12.77 33	59.736 90	63.15 143	21.153 83	91.05 165
27.4	47.299 187	61.57 219	50.892 96	13.10 44	59.646 130	64.58 138	21.070 114	92.70 134
Oct. 7.4	47.112 220	63.76 179	50.796 120	13.54 52	59.516 161	65.96 127	20.956 136	94.04 100
17.3	46.892 241	65.55 134	50.676 134	14.06 57	59.355 179	67.23 108	20.820 151	95.04 66
27.3	46.651 255	66.89 86	50.542 140	14.63 57	59.176 190	68.31 87	20.669 160	95.70 31
Nov. 6.3	46.396 261	67.75 35	50.402 140	15.20 55	58.986 189	69.18 60	20.509 161	96.01 5
16.3	46.135 255	68.10 17	50.262 131	15.75 52	58.797 179	69.78 30	20.348 156	95.96 42
26.2	45.880 243	67.93 69	50.131 116	16.27 46	58.618 161	70.08 0	20.192 143	95.54 77
Dec. 6.2	45.637 222	67.24 120	50.015 97	16.73 39	58.457 137	70.08 31	20.049 127	94.77 109
16.2	45.415 194	66.04 166	49.918 73	17.12 30	58.320 107	69.77 62	19.922 105	93.68 139
26.1	45.221 159	64.38 209	49.845 49	17.42 20	58.213 73	69.15 90	19.817 79	92.29 165
36.1	45.062	62.29	49.796	17.62	58.140	68.25	19.738	90.64
Mean Place	43.539	30.44	46.341	35.42	54.415	81.18	17.082	63.21
Sec $\delta$ , Tan $\delta$	1.522	+1.147	1.030	-0.248	1.265	-0.774	1.108	+0.478
$D\psi\alpha$ , $D_\omega\alpha$	+0.04	-0.06	+0.06	+0.01	+0.07	+0.04	+0.05	-0.03
$D\psi\delta$ , $D_\omega\delta$	+0.3	-0.6	+0.3	-0.5	+0.3	-0.5	+0.3	-0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	79 Draconis. Mag. 6.6		ε Indi. Mag. 4.7		20 Pegasi. Mag. 5.7		α Aquarii. Mag. 3.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 21 51	° ' " +73 18	h m 21 57	° ' " -57 7	h m 21 57	° ' " +12 43	h m 22 1	° ' " - 0 42
	s	"	s	"	s	"	s	"
Jan. 1.1	45.79	52.22	1.080	49.13	2.737	24.72	31.448	81.96
	48	222	100	188	47	128	39	73
11.1	45.31	50.00	0.971	47.25	2.690	23.44	31.409	82.69
	38	265	53	222	19	135	14	69
21.1	44.93	47.35	0.918	45.03	2.671	22.09	31.395	83.38
	27	295	6	248	8	135	13	62
31.1	44.66	44.40	0.924	42.55	2.679	20.74	31.408	84.00
	12	315	64	268	39	128	41	52
Feb. 10.0	44.54	41.25	0.988	39.87	2.718	19.46	31.449	84.52
	1	322	122	282	71	115	71	36
20.0	44.55	38.03	1.110	37.05	2.789	18.31	31.520	84.88
	15	313	179	291	103	97	102	15
Mar. 2.0	44.70	34.90	1.289	34.14	2.892	17.34	31.622	85.03
	29	294	236	292	136	70	133	6
11.9	44.99	31.96	1.525	31.22	3.028	16.64	31.755	84.97
	42	263	290	288	170	42	166	33
21.9	45.41	29.33	1.815	28.34	3.198	16.22	31.921	84.64
	54	221	340	279	203	7	197	60
31.9	45.95	27.12	2.155	25.55	3.401	16.15	32.118	84.04
	64	170	390	262	232	30	226	57
Apr. 10.9	46.59	25.42	2.545	22.93	3.633	16.45	32.344	83.17
	72	114	432	243	261	67	255	114
20.8	47.31	24.28	2.977	20.50	3.894	17.12	32.599	82.03
	77	56	465	216	283	102	277	139
30.8	48.08	23.72	3.442	18.34	4.177	18.14	32.876	80.64
	81	7	494	186	302	135	296	161
May 10.8	48.89	23.79	3.936	16.48	4.479	19.49	33.172	79.03
	82	70	512	151	313	167	309	178
20.8	49.71	24.49	4.448	14.97	4.792	21.16	33.481	77.25
	81	128	520	111	316	191	314	191
30.7	50.52	25.77	4.968	13.86	5.108	23.07	33.795	75.34
	76	182	516	70	312	213	312	198
June 9.7	51.28	27.59	5.484	13.16	5.420	25.20	34.107	73.36
	70	232	499	28	300	226	301	202
19.7	51.98	29.91	5.983	12.88	5.720	27.46	34.408	71.34
	63	276	470	16	282	234	284	198
29.6	52.61	32.67	6.453	13.04	6.002	29.80	34.692	69.36
	53	313	431	58	254	237	259	190
July 9.6	53.14	35.80	6.884	13.62	6.256	32.17	34.951	67.46
	43	342	377	100	222	234	227	178
19.6	53.57	39.22	7.261	14.62	6.478	34.51	35.178	65.68
	31	361	317	137	183	226	192	161
29.6	53.88	42.83	7.578	15.99	6.661	36.77	35.370	64.07
	18	375	247	171	143	212	150	144
Aug. 8.5	54.06	46.58	7.825	17.70	6.804	38.89	35.520	62.63
	7	380	171	196	98	196	107	121
18.5	54.13	50.38	7.996	19.66	6.902	40.85	35.627	61.42
	6	376	92	217	54	176	63	101
28.5	54.07	54.14	8.088	21.83	6.956	42.61	35.690	60.41
	18	365	14	227	12	154	21	77
Sept. 7.5	53.89	57.79	8.102	24.10	6.968	44.15	35.711	59.64
	29	346	62	229	29	129	19	56
17.4	53.60	61.25	8.040	26.39	6.939	45.44	35.692	59.08
	40	324	130	222	64	104	54	35
27.4	53.20	64.49	7.910	28.61	6.875	46.48	35.638	58.73
	48	291	191	205	91	78	85	14
Oct. 7.4	52.72	67.40	7.719	30.66	6.784	47.26	35.553	58.59
	57	248	240	181	116	53	106	2
17.3	52.15	69.88	7.479	32.47	6.668	47.79	35.447	58.61
	63	204	273	148	129	26	123	19
27.3	51.52	71.92	7.206	33.95	6.539	48.05	35.324	58.80
	68	152	296	108	139	1	131	32
Nov. 6.3	50.84	73.44	6.910	35.03	6.400	48.06	35.193	59.12
	70	98	301	64	140	25	131	44
16.3	50.14	74.42	6.609	35.67	6.260	47.81	35.062	59.56
	71	39	293	17	133	48	126	54
26.2	49.43	74.81	6.316	35.84	6.127	47.33	34.936	60.10
	70	22	269	31	122	71	115	63
Dec. 6.2	48.73	74.59	6.047	35.53	6.005	46.62	34.821	60.73
	67	82	239	78	108	91	100	70
16.2	48.06	73.77	5.808	34.75	5.897	45.71	34.721	61.43
	62	141	194	123	87	109	80	73
26.2	47.44	72.36	5.614	33.52	5.810	44.62	34.641	62.16
	54	194	147	164	65	125	59	75
36.1	46.90	70.42	5.467	31.88	5.745	43.37	34.583	62.91
Mean Place	49.247	33.99	1.104	39.60	2.716	18.54	31.295	84.62
Sec δ, Tan δ	3.483	+3.336	1.842	-1.547	1.025	+0.226	1.000	-0.013
Dψ α, Dω α	+0.01	-0.19	+0.08	+0.09	+0.06	-0.01	+0.06	0.00
Dψ δ, Dω δ	+0.3	-0.5	+0.3	-0.5	+0.3	-0.5	+0.3	-0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♌ Aquarii. Mag. 4.4		20 Cephei. Mag. 5.4		α Grus. Mag. 2.2		♌ Pegasi. Mag. 4.0	
	Right Ascension	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 1	° ' " -14 15	h m 22 2	° ' " +62 22	h m 22 3	° ' " -47 21	h m 22 3	° ' " +24 56
	s	"	s	"	s	"	s	"
Jan. 1.1	57.582	83.36	27.56	66.88	0.630	57.66	8.673	30.90
11.1	57.543	83.48	27.29	64.71	0.544	56.19	8.605	29.24
21.1	57.531	83.47	27.08	62.14	0.499	54.41	8.564	27.44
31.1	57.548	83.32	26.94	59.29	0.498	52.36	8.554	25.56
Feb. 10.0	57.593	83.00	26.88	56.26	0.542	50.11	8.578	23.67
20.0	57.669	82.52	26.90	53.18	0.632	47.68	8.637	21.87
Mar. 2.0	57.776	81.84	27.00	50.18	0.767	45.12	8.731	20.26
11.9	57.914	80.98	27.19	47.38	0.947	42.50	8.864	18.88
21.9	58.085	79.91	27.45	44.90	1.172	39.85	9.035	17.84
31.9	58.288	78.64	27.79	42.84	1.438	37.23	9.242	17.18
Apr. 10.9	58.520	77.20	28.20	41.27	1.744	34.69	9.483	16.93
20.8	58.780	75.60	28.67	40.25	2.087	32.26	9.755	17.12
30.8	59.064	73.88	29.17	39.83	2.461	30.01	10.052	17.76
May 10.8	59.368	72.07	29.70	40.01	2.860	28.00	10.367	18.84
20.8	59.685	70.22	30.25	40.79	3.276	26.25	10.695	20.32
30.7	60.008	68.38	30.79	42.15	3.701	24.81	11.027	22.16
June 9.7	60.329	66.59	31.32	44.05	4.124	23.73	11.355	24.31
19.7	60.640	64.91	31.81	46.40	4.536	23.01	11.670	26.71
29.6	60.935	63.36	32.26	49.18	4.925	22.69	11.963	29.30
July 9.6	61.205	62.01	32.66	52.31	5.282	22.76	12.229	32.01
19.6	61.443	60.87	32.98	55.69	5.597	23.21	12.461	34.78
29.6	61.643	59.95	33.23	59.26	5.861	24.03	12.652	37.53
Aug. 8.5	61.802	59.29	33.41	62.94	6.069	25.19	12.799	40.22
18.5	61.916	58.86	33.51	66.66	6.215	26.61	12.901	42.78
28.5	61.984	58.67	33.53	70.33	6.298	28.27	12.957	45.19
Sept. 7.5	62.007	58.69	33.47	73.86	6.317	30.07	12.967	47.37
17.4	61.989	58.91	33.33	77.21	6.275	31.95	12.937	49.32
27.4	61.933	59.27	33.13	80.29	6.176	33.82	12.869	50.99
Oct. 7.4	61.846	59.76	32.88	83.04	6.030	35.60	12.771	52.37
17.3	61.734	60.33	32.57	85.41	5.846	37.20	12.646	53.43
27.3	61.606	60.94	32.22	87.33	5.633	38.57	12.505	54.13
Nov. 6.3	61.470	61.56	31.85	88.74	5.405	39.63	12.354	54.50
16.3	61.332	62.16	31.46	89.62	5.172	40.33	12.199	54.53
26.2	61.200	62.72	31.06	89.94	4.945	40.64	12.048	54.20
Dec. 6.2	61.081	63.21	30.66	89.67	4.736	40.56	11.905	53.53
16.2	60.978	63.62	30.29	88.83	4.551	40.08	11.777	52.54
26.2	60.896	63.94	29.95	87.42	4.399	39.19	11.668	51.25
36.1	60.839	64.14	29.65	85.52	4.283	37.94	11.581	49.72
Mean Place	57.362	82.40	29.121	49.19	0.476	49.43	8.777	21.20
Sec δ, Tan δ	1.032	-0.254	2.157	+1.912	1.476	-1.086	1.103	+0.465
D <sub>φ</sub> α, D <sub>ω</sub> α	+0.06	+0.01	+0.04	-0.11	+0.08	+0.06	+0.05	-0.05
D <sub>φ</sub> δ, D <sub>ω</sub> δ	+0.3	-0.5	+0.3	-0.5	+0.3	-0.5	+0.3	-0.5



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Pegasi. Mag. 3.7			$\pi$ Pegasi. Mag. 4.4			$\zeta$ Cephei. Mag. 3.6			$\beta$ Cephei. Mag. 5.0		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "	h m	s	° ' "
	22 6		+ 5 47	22 6		+32 46	22 7		+57 47	22 8		+71 55
Jan. 1.1	0.934	47	25.43	17.768	89	25.73	57.225	221	47.99	10.08	47	75.00
11.1	0.887	21	24.44	17.679	59	23.91	57.004	172	45.87	9.61	38	72.95
21.1	0.866	5	23.44	17.620	26	21.85	56.832	114	43.38	9.23	28	70.45
31.1	0.871		22.47	17.594		19.67	56.718		40.61	8.95		67.61
Feb. 10.0	0.906	35	21.58	17.605	11	17.45	56.668	50	37.67	8.79	16	64.54
		64			48			17			3	
20.0	0.970		20.85	17.653		15.30	56.685		34.69	8.76		61.37
Mar. 2.0	1.065	95	20.29	17.744	91	13.29	56.775	90	31.78	8.86	10	58.22
12.0	1.194	129	19.99	17.876	132	11.53	56.936	161	29.08	9.08	22	55.24
21.9	1.356	162	19.95	18.050	174	10.09	57.168	232	26.69	9.44	36	52.54
31.9	1.549	193	20.22	18.265	215	9.06	57.465	297	24.71	9.90	46	50.22
		225			252			357			57	
Apr. 10.9	1.774		20.81	18.517		8.47	57.822		23.22	10.47		48.37
20.8	2.027	253	21.71	18.801	284	8.36	58.229	407	22.28	11.11	64	47.06
30.8	2.304	277	22.92	19.114	313	8.74	58.676	477	21.91	11.82	71	46.34
May 10.8	2.599	295	24.40	19.446	345	9.61	59.149	487	22.13	12.57	77	46.23
20.8	2.909	310	26.13	19.791	349	10.94	59.636	488	22.94	13.34	76	46.74
		315										
30.7	3.224		28.04	20.140		12.69	60.124		24.32	14.10		47.84
June 9.7	3.537	313	30.10	20.484	344	14.82	60.600	476	26.22	14.84	74	49.50
19.7	3.839	302	32.24	20.814	330	17.25	61.049	449	28.56	15.53	69	51.67
29.7	4.125	286	34.41	21.121	307	19.94	61.461	412	31.32	16.16	63	54.30
July 9.6	4.385	260	36.55	21.398	277	22.80	61.826	365	34.41	16.70	54	57.31
		230			240			309			44	
19.6	4.615		38.61	21.638		25.77	62.135		37.75	17.14		60.63
29.6	4.807	192	40.56	21.835	197	28.78	62.380	245	41.28	17.49	35	64.19
Aug. 8.5	4.960	153	42.35	21.987	152	31.77	62.557	177	44.89	17.73	24	67.90
18.5	5.069	109	43.94	22.090	103	34.68	62.666	109	48.53	17.86	13	71.69
28.5	5.135	66	45.33	22.144	54	37.45	62.703	31	52.12	17.85	1	75.48
		23			8						10	
Sept. 7.5	5.158		46.48	22.152		40.01	62.672		55.57	17.75		79.19
17.4	5.142	16	47.42	22.116	36	42.35	62.576	96	58.83	17.55	20	82.73
27.4	5.091	51	48.11	22.040	76	44.39	62.422	154	61.83	17.24	31	86.05
Oct. 7.4	5.009	82	48.58	21.930	110	46.12	62.215	207	64.49	16.84	40	89.06
17.4	4.906	103	48.83	21.794	136	47.52	61.965	250	66.78	16.36	48	91.71
		121			156			285			54	
27.3	4.785		48.88	21.638		48.53	61.680		68.63	15.82		93.92
Nov. 6.3	4.655	130	48.73	21.469	169	49.16	61.369	311	69.99	15.23	59	95.64
16.3	4.524	131	48.39	21.296	173	49.38	61.044	325	70.83	14.60	63	96.82
26.2	4.397	127	47.89	21.124	172	49.18	60.714	330	71.12	13.96	64	97.42
Dec. 6.2	4.280	117	47.22	20.961	163	48.58	60.389	325	70.85	13.33	63	97.41
		103			151			309			62	
16.2	4.177		46.44	20.810		47.58	60.080		70.02	12.71		96.80
26.2	4.092	85	45.54	20.679	131	46.22	59.795	285	68.65	12.13	58	95.60
36.1	4.029	63	44.56	20.571	108	44.54	59.546	249	66.79	11.61	52	93.84
Mean Place	0.805		20.84	17.996		13.86	58.365		30.65	12.885		55.62
Sec $\delta$ , Tan $\delta$	1.005		+0.101	1.189		+0.644	1.876		+1.588	3.225		+3.066
$D\psi \alpha$ , $D\omega \alpha$	+0.06		-0.01	+0.05		-0.04	+0.04		-0.09	+0.02		-0.18
$D\psi \delta$ , $D\omega \delta$	+0.3		-0.5	+0.3		-0.5	+0.4		-0.5	+0.4		-0.5

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\theta$ Aquarii. Mag. 4.3		$\alpha$ Tucanae. Mag. 2.9		$\gamma$ Aquarii. Mag. 4.0		$\beta$ Pegasi. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 12	° ' " - 8 11	h m 22 12	° ' " -60 39	h m 22 17	° ' " - 1 47	h m 22 17	° ' " +11 47
Jan. 1.1	27.539 <sup>s</sup>	48.32 <sup>'</sup>	49.49 <sup>s</sup>	95.38 <sup>'</sup>	22.420 <sup>s</sup>	78.50 <sup>'</sup>	26.094 <sup>s</sup>	18.17 <sup>'</sup>
11.1	27.493 <sup>46</sup>	48.72 <sup>40</sup>	49.32 <sup>17</sup>	93.38 <sup>200</sup>	22.369 <sup>51</sup>	79.17 <sup>67</sup>	26.035 <sup>59</sup>	16.99 <sup>118</sup>
21.1	27.472 <sup>21</sup>	49.03 <sup>31</sup>	49.20 <sup>12</sup>	91.03 <sup>235</sup>	22.343 <sup>26</sup>	79.79 <sup>62</sup>	26.000 <sup>35</sup>	15.76 <sup>123</sup>
31.1	27.477 <sup>3</sup>	49.21 <sup>18</sup>	49.15 <sup>5</sup>	88.37 <sup>266</sup>	22.341 <sup>2</sup>	80.33 <sup>54</sup>	25.990 <sup>10</sup>	14.52 <sup>124</sup>
Feb. 10.0	27.510 <sup>55</sup>	49.26 <sup>5</sup>	49.17 <sup>2</sup>	85.47 <sup>290</sup>	22.368 <sup>27</sup>	80.75 <sup>42</sup>	26.009 <sup>19</sup>	13.34 <sup>118</sup>
	63	11	8	307	55	26	50	107
20.0	27.573 <sup>s</sup>	49.15 <sup>'</sup>	49.25 <sup>s</sup>	82.40 <sup>'</sup>	22.423 <sup>s</sup>	81.01 <sup>'</sup>	26.059 <sup>s</sup>	12.27 <sup>'</sup>
Mar. 2.0	27.666 <sup>93</sup>	48.84 <sup>31</sup>	49.39 <sup>14</sup>	79.24 <sup>316</sup>	22.509 <sup>86</sup>	81.09 <sup>8</sup>	26.142 <sup>83</sup>	11.37 <sup>90</sup>
12.0	27.792 <sup>126</sup>	48.31 <sup>53</sup>	49.59 <sup>20</sup>	76.04 <sup>320</sup>	22.628 <sup>119</sup>	80.94 <sup>15</sup>	26.258 <sup>116</sup>	10.72 <sup>65</sup>
21.9	27.950 <sup>158</sup>	47.54 <sup>77</sup>	49.85 <sup>26</sup>	72.88 <sup>316</sup>	22.779 <sup>151</sup>	80.55 <sup>39</sup>	26.409 <sup>151</sup>	10.35 <sup>37</sup>
31.9	28.139 <sup>189</sup>	46.56 <sup>98</sup>	50.18 <sup>33</sup>	69.82 <sup>306</sup>	22.962 <sup>183</sup>	79.88 <sup>67</sup>	26.594 <sup>185</sup>	10.30 <sup>5</sup>
	221	121	38	291	216	92	217	29
Apr. 10.9	28.360 <sup>s</sup>	45.35 <sup>'</sup>	50.56 <sup>s</sup>	66.91 <sup>'</sup>	23.178 <sup>s</sup>	78.96 <sup>'</sup>	26.811 <sup>s</sup>	10.59 <sup>'</sup>
20.8	28.610 <sup>250</sup>	43.93 <sup>142</sup>	50.99 <sup>43</sup>	64.22 <sup>299</sup>	23.423 <sup>245</sup>	77.77 <sup>119</sup>	27.059 <sup>248</sup>	11.25 <sup>66</sup>
30.8	28.884 <sup>274</sup>	42.32 <sup>161</sup>	51.47 <sup>48</sup>	61.80 <sup>242</sup>	23.693 <sup>270</sup>	76.34 <sup>143</sup>	27.335 <sup>276</sup>	12.25 <sup>100</sup>
May 10.8	29.179 <sup>295</sup>	40.58 <sup>174</sup>	51.98 <sup>51</sup>	59.70 <sup>210</sup>	23.984 <sup>291</sup>	74.70 <sup>164</sup>	27.627 <sup>292</sup>	13.57 <sup>132</sup>
20.8	29.490 <sup>311</sup>	38.73 <sup>185</sup>	52.52 <sup>54</sup>	57.97 <sup>173</sup>	24.291 <sup>307</sup>	72.91 <sup>179</sup>	27.937 <sup>310</sup>	15.19 <sup>162</sup>
	317	191	55	132	314	193	317	187
30.7	29.807 <sup>s</sup>	36.82 <sup>'</sup>	53.07 <sup>s</sup>	56.65 <sup>'</sup>	24.605 <sup>s</sup>	70.98 <sup>'</sup>	28.254 <sup>s</sup>	17.06 <sup>'</sup>
June 9.7	30.124 <sup>317</sup>	34.91 <sup>191</sup>	53.62 <sup>55</sup>	55.78 <sup>87</sup>	24.920 <sup>315</sup>	68.99 <sup>199</sup>	28.570 <sup>316</sup>	19.14 <sup>208</sup>
19.7	30.432 <sup>308</sup>	33.04 <sup>187</sup>	54.15 <sup>53</sup>	55.36 <sup>42</sup>	25.227 <sup>307</sup>	68.98 <sup>201</sup>	28.877 <sup>307</sup>	21.36 <sup>222</sup>
29.7	30.726 <sup>294</sup>	31.26 <sup>178</sup>	54.65 <sup>50</sup>	55.40 <sup>4</sup>	25.519 <sup>292</sup>	65.01 <sup>197</sup>	29.169 <sup>292</sup>	23.66 <sup>230</sup>
July 9.6	30.996 <sup>270</sup>	29.62 <sup>164</sup>	55.11 <sup>46</sup>	55.90 <sup>50</sup>	25.788 <sup>269</sup>	63.12 <sup>189</sup>	29.437 <sup>268</sup>	25.99 <sup>233</sup>
	241	147	42	93	240	176	238	230
19.6	31.237 <sup>s</sup>	28.15 <sup>'</sup>	55.53 <sup>s</sup>	56.83 <sup>'</sup>	26.028 <sup>s</sup>	61.36 <sup>'</sup>	29.675 <sup>s</sup>	28.29 <sup>'</sup>
29.6	31.441 <sup>204</sup>	26.90 <sup>125</sup>	55.88 <sup>35</sup>	58.19 <sup>136</sup>	26.232 <sup>204</sup>	59.77 <sup>159</sup>	29.877 <sup>202</sup>	30.51 <sup>222</sup>
Aug. 8.5	31.605 <sup>161</sup>	25.86 <sup>104</sup>	56.16 <sup>28</sup>	59.90 <sup>171</sup>	26.397 <sup>165</sup>	58.37 <sup>140</sup>	30.037 <sup>160</sup>	32.60 <sup>209</sup>
18.5	31.726 <sup>124</sup>	25.06 <sup>80</sup>	56.35 <sup>19</sup>	61.90 <sup>200</sup>	26.520 <sup>123</sup>	57.19 <sup>118</sup>	30.156 <sup>119</sup>	34.54 <sup>194</sup>
28.5	31.802 <sup>76</sup>	24.48 <sup>58</sup>	56.46 <sup>11</sup>	64.10 <sup>220</sup>	26.599 <sup>79</sup>	56.23 <sup>96</sup>	30.232 <sup>76</sup>	36.27 <sup>173</sup>
	33	35	2	238	37	72	32	152
Sept. 7.5	31.835 <sup>s</sup>	24.13 <sup>'</sup>	56.48 <sup>s</sup>	66.48 <sup>'</sup>	26.636 <sup>s</sup>	55.51 <sup>'</sup>	30.264 <sup>s</sup>	37.79 <sup>'</sup>
17.4	31.827 <sup>8</sup>	24.01 <sup>12</sup>	56.42 <sup>6</sup>	68.88 <sup>240</sup>	26.633 <sup>3</sup>	55.00 <sup>51</sup>	30.256 <sup>8</sup>	39.06 <sup>127</sup>
27.4	31.783 <sup>44</sup>	24.06 <sup>5</sup>	56.28 <sup>14</sup>	71.22 <sup>234</sup>	26.592 <sup>41</sup>	54.71 <sup>29</sup>	30.213 <sup>43</sup>	40.10 <sup>104</sup>
Oct. 7.4	31.707 <sup>76</sup>	24.28 <sup>22</sup>	56.07 <sup>21</sup>	73.41 <sup>219</sup>	26.521 <sup>71</sup>	54.61 <sup>10</sup>	30.138 <sup>75</sup>	40.88 <sup>78</sup>
17.4	31.607 <sup>100</sup>	24.63 <sup>35</sup>	55.81 <sup>26</sup>	75.34 <sup>193</sup>	26.426 <sup>95</sup>	54.68 <sup>7</sup>	30.040 <sup>98</sup>	41.42 <sup>54</sup>
	119	44	31	180	114	23	118	28
27.3	31.488 <sup>s</sup>	25.07 <sup>'</sup>	55.50 <sup>s</sup>	76.94 <sup>'</sup>	26.312 <sup>s</sup>	54.91 <sup>'</sup>	29.922 <sup>s</sup>	41.70 <sup>'</sup>
Nov. 6.3	31.360 <sup>128</sup>	25.58 <sup>51</sup>	55.15 <sup>35</sup>	78.13 <sup>119</sup>	26.189 <sup>123</sup>	55.26 <sup>35</sup>	29.794 <sup>128</sup>	41.74 <sup>4</sup>
16.3	31.229 <sup>131</sup>	26.14 <sup>56</sup>	54.80 <sup>35</sup>	78.86 <sup>73</sup>	26.062 <sup>127</sup>	55.72 <sup>46</sup>	29.662 <sup>132</sup>	41.54 <sup>20</sup>
26.2	31.102 <sup>127</sup>	26.72 <sup>58</sup>	54.45 <sup>35</sup>	79.10 <sup>24</sup>	25.937 <sup>125</sup>	56.27 <sup>55</sup>	29.532 <sup>130</sup>	41.13 <sup>41</sup>
Dec. 6.2	30.986 <sup>116</sup>	27.30 <sup>58</sup>	54.11 <sup>34</sup>	78.83 <sup>27</sup>	25.822 <sup>115</sup>	56.89 <sup>62</sup>	29.408 <sup>124</sup>	40.49 <sup>64</sup>
	103	55	30	79	104	66	110	83
16.2	30.883 <sup>s</sup>	27.85 <sup>'</sup>	53.81 <sup>s</sup>	78.04 <sup>'</sup>	25.718 <sup>s</sup>	57.55 <sup>'</sup>	29.298 <sup>s</sup>	39.66 <sup>'</sup>
26.2	30.798 <sup>85</sup>	28.37 <sup>52</sup>	53.55 <sup>26</sup>	76.76 <sup>128</sup>	25.631 <sup>87</sup>	58.24 <sup>69</sup>	29.204 <sup>94</sup>	38.68 <sup>98</sup>
36.1	30.735 <sup>63</sup>	28.83 <sup>46</sup>	53.33 <sup>22</sup>	75.04 <sup>172</sup>	25.565 <sup>66</sup>	58.93 <sup>69</sup>	29.128 <sup>76</sup>	37.54 <sup>114</sup>
Mean Place	27.295	49.13	49.495	85.05	22.185	81.22	25.990	11.51
Sec $\delta$ , Tan $\delta$	1.010	-0.144	2.042	-1.780	1.000	-0.031	1.022	+0.209
$D\psi\alpha$ , $D_\omega\alpha$	+0.06	+0.01	+0.08	+0.11	+0.06	0.00	+0.08	-0.01
$D\psi\delta$ , $D_\omega\delta$	+0.4	-0.5	+0.4	-0.5	+0.4	-0.4	+0.4	-0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	3 Lacertæ. Mag. 4.6		π Aquarii. Mag. 4.6		σ Aquarii. Mag. 4.9		α Lacertæ. Mag. 3.8	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	22 20	+51 48	22 21	+ 0 57	22 26	-11 5	22 27	+49 1
	s	"	s	"	s	"	s	"
Jan. 1.2	16.946 <sup>184</sup>	63.41 <sup>198</sup>	2.526 <sup>54</sup>	24.30 <sup>77</sup>	15.710 <sup>56</sup>	70.69 <sup>26</sup>	51.662 <sup>175</sup>	36.53 <sup>1</sup>
11.1	16.762 <sup>144</sup>	61.43 <sup>233</sup>	2.472 <sup>30</sup>	23.53 <sup>75</sup>	15.654 <sup>32</sup>	70.95 <sup>16</sup>	51.487 <sup>141</sup>	34.65 <sup>2</sup>
21.1	16.618 <sup>99</sup>	59.10 <sup>261</sup>	2.442 <sup>6</sup>	22.78 <sup>67</sup>	15.622 <sup>8</sup>	71.11 <sup>2</sup>	51.346 <sup>98</sup>	32.40 <sup>2</sup>
31.1	16.519 <sup>46</sup>	56.49 <sup>277</sup>	2.436 <sup>22</sup>	22.11 <sup>58</sup>	15.614 <sup>21</sup>	71.13 <sup>13</sup>	51.248 <sup>50</sup>	29.88 <sup>2</sup>
Feb. 10.0	16.473 <sup>10</sup>	53.72 <sup>281</sup>	2.458 <sup>50</sup>	21.53 <sup>43</sup>	15.635 <sup>48</sup>	71.00 <sup>33</sup>	51.198 <sup>3</sup>	27.20 <sup>2</sup>
20.0	16.483	50.91	2.508	21.10	15.683	70.67	51.201	24.47
Mar. 2.0	16.552 <sup>69</sup>	48.16 <sup>275</sup>	2.591 <sup>83</sup>	20.87 <sup>23</sup>	15.763 <sup>80</sup>	70.16 <sup>51</sup>	51.260 <sup>59</sup>	21.80 <sup>2</sup>
12.0	16.683 <sup>131</sup>	45.61 <sup>255</sup>	2.705 <sup>114</sup>	20.85 <sup>2</sup>	15.875 <sup>112</sup>	69.43 <sup>73</sup>	51.378 <sup>118</sup>	19.30 <sup>2</sup>
21.9	16.875 <sup>192</sup>	43.35 <sup>226</sup>	2.852 <sup>147</sup>	21.10 <sup>25</sup>	16.020 <sup>145</sup>	68.50 <sup>93</sup>	51.555 <sup>177</sup>	17.09 <sup>2</sup>
31.9	17.125 <sup>250</sup>	41.47 <sup>188</sup>	3.032 <sup>180</sup>	21.61 <sup>51</sup>	16.198 <sup>178</sup>	67.34 <sup>116</sup>	51.790 <sup>235</sup>	15.25 <sup>1</sup>
	304 <sup>140</sup>		212	80	211	136	286	1
Apr. 10.9	17.429	40.07 <sup>88</sup>	3.244 <sup>241</sup>	22.41 <sup>108</sup>	16.409	65.98 <sup>155</sup>	52.076 <sup>333</sup>	13.86
20.9	17.779 <sup>350</sup>	39.19 <sup>23</sup>	3.485 <sup>269</sup>	23.49 <sup>134</sup>	16.650 <sup>241</sup>	64.43 <sup>171</sup>	52.409 <sup>370</sup>	12.98
30.8	18.168 <sup>389</sup>	38.86 <sup>24</sup>	3.754 <sup>289</sup>	24.83 <sup>158</sup>	16.919 <sup>269</sup>	62.72 <sup>183</sup>	52.779 <sup>401</sup>	12.65
May 10.8	18.584 <sup>416</sup>	39.10 <sup>80</sup>	4.043 <sup>305</sup>	26.41 <sup>176</sup>	17.210 <sup>291</sup>	60.89 <sup>190</sup>	53.180 <sup>419</sup>	12.87
20.8	19.018 <sup>438</sup>	39.90 <sup>134</sup>	4.348 <sup>313</sup>	28.17 <sup>192</sup>	17.518 <sup>318</sup>	58.99 <sup>194</sup>	53.599 <sup>426</sup>	13.64
30.7	19.456	41.24	4.661	30.09	17.836	57.05	54.025	14.94
June 9.7	19.886 <sup>430</sup>	43.08 <sup>184</sup>	4.976 <sup>315</sup>	32.10 <sup>201</sup>	18.156 <sup>320</sup>	55.13 <sup>192</sup>	54.447 <sup>422</sup>	16.74
19.7	20.300 <sup>414</sup>	45.36 <sup>228</sup>	5.282 <sup>306</sup>	34.15 <sup>205</sup>	18.471 <sup>315</sup>	53.28 <sup>185</sup>	54.854 <sup>407</sup>	18.98
29.7	20.684 <sup>384</sup>	48.03 <sup>267</sup>	5.575 <sup>293</sup>	36.20 <sup>205</sup>	18.771 <sup>300</sup>	51.54 <sup>174</sup>	55.234 <sup>380</sup>	21.60
July 9.6	21.030 <sup>346</sup>	51.02 <sup>299</sup>	5.844 <sup>269</sup>	38.19 <sup>199</sup>	19.052 <sup>281</sup>	49.98 <sup>156</sup>	55.580 <sup>346</sup>	24.53
	299	323	242	189	251	138	302	1
19.6	21.329	54.25	6.086	40.08	19.303	48.60	55.882	27.70
29.6	21.574 <sup>245</sup>	57.64 <sup>339</sup>	6.292 <sup>206</sup>	41.82 <sup>174</sup>	19.520 <sup>217</sup>	47.45 <sup>115</sup>	56.133 <sup>251</sup>	31.04
Aug. 8.6	21.762 <sup>188</sup>	61.12 <sup>348</sup>	6.459 <sup>167</sup>	43.36 <sup>154</sup>	19.698 <sup>178</sup>	46.53 <sup>92</sup>	56.329 <sup>196</sup>	34.47
18.5	21.889 <sup>127</sup>	64.62 <sup>350</sup>	6.584 <sup>125</sup>	44.71 <sup>135</sup>	19.833 <sup>135</sup>	45.87 <sup>66</sup>	56.467 <sup>138</sup>	37.92
28.5	21.955 <sup>66</sup>	68.07 <sup>345</sup>	6.666 <sup>82</sup>	45.83 <sup>112</sup>	19.925 <sup>92</sup>	45.46 <sup>41</sup>	56.546 <sup>79</sup>	41.32
	5	332	40	90	47	17	21	3
Sept. 7.5	21.960	71.39	6.706	46.73	19.972	45.29	56.567	44.61
17.4	21.907 <sup>53</sup>	74.52 <sup>313</sup>	6.706 <sup>0</sup>	47.39 <sup>66</sup>	19.977 <sup>5</sup>	45.32 <sup>3</sup>	56.533 <sup>34</sup>	47.70
27.4	21.802 <sup>105</sup>	77.40 <sup>288</sup>	6.669 <sup>37</sup>	47.84 <sup>45</sup>	19.945 <sup>32</sup>	45.55 <sup>23</sup>	56.447 <sup>86</sup>	50.55
Oct. 7.4	21.651 <sup>151</sup>	79.96 <sup>256</sup>	6.600 <sup>69</sup>	48.07 <sup>23</sup>	19.879 <sup>66</sup>	45.92 <sup>37</sup>	56.316 <sup>131</sup>	53.09
17.4	21.462 <sup>223</sup>	82.15 <sup>219</sup>	6.508 <sup>92</sup>	48.12 <sup>5</sup>	19.787 <sup>128</sup>	46.41 <sup>58</sup>	56.147 <sup>169</sup>	55.29
		178	112	12	112		201	1
27.3	21.239	83.93	6.396	48.00	19.875	46.99	55.946	57.08
Nov. 6.3	20.995 <sup>244</sup>	85.25 <sup>132</sup>	6.274 <sup>122</sup>	47.71 <sup>29</sup>	19.551 <sup>124</sup>	47.61 <sup>62</sup>	55.722 <sup>224</sup>	58.42
16.3	20.735 <sup>260</sup>	86.08 <sup>83</sup>	6.148 <sup>126</sup>	47.30 <sup>41</sup>	19.422 <sup>129</sup>	48.25 <sup>64</sup>	55.483 <sup>239</sup>	59.28
26.3	20.470 <sup>265</sup>	86.39 <sup>31</sup>	6.023 <sup>125</sup>	46.78 <sup>52</sup>	19.294 <sup>128</sup>	48.87 <sup>62</sup>	55.237 <sup>246</sup>	59.63
Dec. 6.2	20.207 <sup>263</sup>	86.17 <sup>22</sup>	5.907 <sup>116</sup>	46.15 <sup>63</sup>	19.175 <sup>119</sup>	49.46 <sup>59</sup>	54.992 <sup>245</sup>	59.47
	252	76	105	71	109	53	237	
16.2	19.955	85.41	5.802	45.44	19.066	49.99	54.755	58.79
26.2	19.721 <sup>234</sup>	84.14 <sup>127</sup>	5.712 <sup>90</sup>	44.69 <sup>75</sup>	18.974 <sup>92</sup>	50.44 <sup>45</sup>	54.535 <sup>220</sup>	57.60
36.1	19.517 <sup>204</sup>	82.41 <sup>173</sup>	5.643 <sup>69</sup>	43.91 <sup>78</sup>	18.902 <sup>72</sup>	50.80 <sup>36</sup>	54.338 <sup>197</sup>	55.95
Mean Place	17.636	46.37	2.291	20.70	15.390	70.87	52.200	19.43
Sec δ, Tan δ	1.618	+1.272	1.000	+0.017	1.019	-0.196	1.551	+1.186
D <sub>δ</sub> α, D <sub>α</sub> α	+0.05	-0.08	+0.06	0.00	+0.06	+0.01	+0.05	-0.07
D <sub>δ</sub> δ, D <sub>α</sub> δ	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	♊ Aquarii. Mag. 5.3		226 B. Cephei. Mag. 5.7		♊ Aquarii. Mag. 4.1		10 Lacertæ. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 30	° ' " -21 7	h m 22 30	° ' " +75 47	h m 22 31	° ' " - 0 32	h m 22 35	° ' " +38 36
	s	"	s	"	s	"	s	"
Jan. 1.2	9.663 <sup>62</sup>	64.66 <sup>15</sup>	45.96 <sup>07</sup>	76.42 <sup>174</sup>	5.799 <sup>60</sup>	40.91 <sup>70</sup>	31.956 <sup>126</sup>	79.34 <sup>171</sup>
11.1	9.601 <sup>39</sup>	64.51 <sup>34</sup>	45.29 <sup>57</sup>	74.68 <sup>224</sup>	5.739 <sup>38</sup>	41.61 <sup>66</sup>	31.830 <sup>101</sup>	77.63 <sup>201</sup>
21.1	9.562 <sup>11</sup>	64.17 <sup>53</sup>	44.72 <sup>45</sup>	72.44 <sup>264</sup>	5.701 <sup>13</sup>	42.27 <sup>59</sup>	31.729 <sup>67</sup>	75.62 <sup>220</sup>
31.1	9.551 <sup>—</sup>	63.64 <sup>75</sup>	44.27 <sup>29</sup>	69.80 <sup>293</sup>	5.688 <sup>13</sup>	42.86 <sup>48</sup>	31.662 <sup>31</sup>	73.42 <sup>232</sup>
Feb. 10.1	9.568 <sup>46</sup>	62.89 <sup>93</sup>	43.98 <sup>15</sup>	66.87 <sup>312</sup>	5.701 <sup>40</sup>	43.34 <sup>34</sup>	31.631 <sup>10</sup>	71.10 <sup>233</sup>
20.0	9.614 <sup>79</sup>	61.96 <sup>114</sup>	43.83 <sup>2</sup>	63.75 <sup>317</sup>	5.741 <sup>72</sup>	43.68 <sup>13</sup>	31.641 <sup>55</sup>	68.77 <sup>225</sup>
Mar. 2.0	9.693 <sup>113</sup>	60.82 <sup>132</sup>	43.85 <sup>19</sup>	60.58 <sup>307</sup>	5.813 <sup>104</sup>	43.81 <sup>8</sup>	31.696 <sup>101</sup>	66.52 <sup>206</sup>
12.0	9.806 <sup>147</sup>	59.50 <sup>151</sup>	44.04 <sup>34</sup>	57.51 <sup>288</sup>	5.917 <sup>137</sup>	43.73 <sup>33</sup>	31.797 <sup>148</sup>	64.46 <sup>179</sup>
21.9	9.953 <sup>182</sup>	57.99 <sup>168</sup>	44.38 <sup>50</sup>	54.63 <sup>255</sup>	6.054 <sup>172</sup>	43.40 <sup>60</sup>	31.945 <sup>196</sup>	62.67 <sup>142</sup>
31.9	10.135 <sup>216</sup>	56.31 <sup>180</sup>	44.88 <sup>64</sup>	52.08 <sup>213</sup>	6.226 <sup>204</sup>	42.80 <sup>87</sup>	32.141 <sup>240</sup>	61.25 <sup>99</sup>
Apr. 10.9	10.351 <sup>247</sup>	54.51 <sup>191</sup>	45.52 <sup>76</sup>	49.95 <sup>163</sup>	6.430 <sup>235</sup>	41.93 <sup>114</sup>	32.381 <sup>279</sup>	60.26 <sup>52</sup>
20.9	10.598 <sup>275</sup>	52.60 <sup>199</sup>	46.28 <sup>84</sup>	48.32 <sup>108</sup>	6.665 <sup>264</sup>	40.79 <sup>138</sup>	32.660 <sup>315</sup>	59.74 <sup>3</sup>
30.8	10.873 <sup>300</sup>	50.61 <sup>202</sup>	47.12 <sup>91</sup>	47.24 <sup>48</sup>	6.929 <sup>286</sup>	39.41 <sup>162</sup>	32.975 <sup>343</sup>	59.71 <sup>49</sup>
May 10.8	11.173 <sup>318</sup>	48.59 <sup>200</sup>	48.03 <sup>94</sup>	46.76 <sup>12</sup>	7.215 <sup>304</sup>	37.79 <sup>178</sup>	33.318 <sup>360</sup>	60.20 <sup>97</sup>
20.8	11.491 <sup>329</sup>	46.59 <sup>194</sup>	48.97 <sup>95</sup>	46.88 <sup>72</sup>	7.519 <sup>313</sup>	36.01 <sup>193</sup>	33.678 <sup>370</sup>	61.17 <sup>144</sup>
30.8	11.820 <sup>333</sup>	44.65 <sup>182</sup>	49.92 <sup>93</sup>	47.60 <sup>130</sup>	7.832 <sup>315</sup>	34.08 <sup>201</sup>	34.048 <sup>370</sup>	62.61 <sup>186</sup>
June 9.7	12.153 <sup>329</sup>	42.83 <sup>164</sup>	50.85 <sup>89</sup>	48.90 <sup>184</sup>	8.147 <sup>311</sup>	32.07 <sup>204</sup>	34.418 <sup>360</sup>	64.47 <sup>225</sup>
19.7	12.482 <sup>315</sup>	41.19 <sup>145</sup>	51.74 <sup>82</sup>	50.74 <sup>233</sup>	8.458 <sup>297</sup>	30.03 <sup>202</sup>	34.778 <sup>341</sup>	66.72 <sup>255</sup>
29.7	12.797 <sup>294</sup>	39.74 <sup>119</sup>	52.56 <sup>72</sup>	53.07 <sup>276</sup>	8.755 <sup>248</sup>	28.01 <sup>195</sup>	35.119 <sup>312</sup>	69.27 <sup>280</sup>
July 9.6	13.091 <sup>266</sup>	38.55 <sup>95</sup>	53.28 <sup>62</sup>	55.83 <sup>313</sup>	9.031 <sup>215</sup>	26.06 <sup>167</sup>	35.431 <sup>278</sup>	72.07 <sup>298</sup>
19.6	13.357 <sup>230</sup>	37.60 <sup>66</sup>	53.90 <sup>50</sup>	58.96 <sup>342</sup>	9.279 <sup>215</sup>	24.23 <sup>167</sup>	35.709 <sup>236</sup>	75.05 <sup>310</sup>
29.6	13.587 <sup>190</sup>	36.94 <sup>36</sup>	54.40 <sup>36</sup>	62.38 <sup>362</sup>	9.494 <sup>176</sup>	22.56 <sup>149</sup>	35.945 <sup>190</sup>	78.15 <sup>314</sup>
Aug. 8.6	13.777 <sup>146</sup>	36.58 <sup>9</sup>	54.76 <sup>23</sup>	66.00 <sup>375</sup>	9.670 <sup>135</sup>	21.07 <sup>127</sup>	36.135 <sup>141</sup>	81.29 <sup>311</sup>
18.5	13.923 <sup>100</sup>	36.49 <sup>18</sup>	54.99 <sup>9</sup>	69.75 <sup>382</sup>	9.805 <sup>93</sup>	19.80 <sup>104</sup>	36.276 <sup>91</sup>	84.40 <sup>301</sup>
28.5	14.023 <sup>53</sup>	36.67 <sup>42</sup>	55.08 <sup>5</sup>	73.57 <sup>380</sup>	9.898 <sup>50</sup>	18.76 <sup>81</sup>	36.367 <sup>40</sup>	87.41 <sup>288</sup>
Sept. 7.5	14.076 <sup>9</sup>	37.09 <sup>61</sup>	55.03 <sup>19</sup>	77.37 <sup>370</sup>	9.948 <sup>9</sup>	17.95 <sup>58</sup>	36.407 <sup>6</sup>	90.29 <sup>267</sup>
17.4	14.085 <sup>33</sup>	37.70 <sup>78</sup>	54.84 <sup>31</sup>	81.07 <sup>352</sup>	9.957 <sup>28</sup>	17.37 <sup>37</sup>	36.401 <sup>49</sup>	92.96 <sup>244</sup>
27.4	14.052 <sup>69</sup>	38.48 <sup>88</sup>	54.53 <sup>40</sup>	84.59 <sup>327</sup>	9.929 <sup>60</sup>	17.00 <sup>16</sup>	36.352 <sup>88</sup>	95.40 <sup>213</sup>
Oct. 7.4	13.983 <sup>96</sup>	39.36 <sup>93</sup>	54.10 <sup>54</sup>	87.86 <sup>294</sup>	9.869 <sup>84</sup>	16.84 <sup>2</sup>	36.264 <sup>121</sup>	97.53 <sup>180</sup>
17.4	13.887 <sup>120</sup>	40.29 <sup>94</sup>	53.56 <sup>64</sup>	90.80 <sup>255</sup>	9.785 <sup>104</sup>	16.86 <sup>19</sup>	36.143 <sup>146</sup>	99.33 <sup>144</sup>
27.3	13.767 <sup>132</sup>	41.23 <sup>89</sup>	52.92 <sup>71</sup>	93.35 <sup>209</sup>	9.681 <sup>118</sup>	17.05 <sup>33</sup>	35.997 <sup>166</sup>	100.77 <sup>104</sup>
Nov. 6.3	13.635 <sup>139</sup>	42.12 <sup>80</sup>	52.21 <sup>76</sup>	95.44 <sup>157</sup>	9.563 <sup>123</sup>	17.38 <sup>44</sup>	35.831 <sup>177</sup>	101.81 <sup>61</sup>
16.3	13.496 <sup>138</sup>	42.92 <sup>68</sup>	51.45 <sup>80</sup>	97.01 <sup>101</sup>	9.440 <sup>122</sup>	17.82 <sup>54</sup>	35.654 <sup>183</sup>	102.42 <sup>17</sup>
26.3	13.358 <sup>132</sup>	43.60 <sup>54</sup>	50.65 <sup>82</sup>	98.02 <sup>40</sup>	9.318 <sup>116</sup>	18.36 <sup>62</sup>	35.471 <sup>182</sup>	102.59 <sup>27</sup>
Dec. 6.2	13.226 <sup>118</sup>	44.14 <sup>37</sup>	49.83 <sup>82</sup>	98.42 <sup>22</sup>	9.202 <sup>107</sup>	18.98 <sup>68</sup>	35.289 <sup>175</sup>	102.32 <sup>72</sup>
16.2	13.108 <sup>102</sup>	44.51 <sup>17</sup>	49.01 <sup>78</sup>	98.20 <sup>82</sup>	9.095 <sup>92</sup>	19.66 <sup>72</sup>	35.114 <sup>162</sup>	101.60 <sup>114</sup>
26.2	13.006 <sup>80</sup>	44.68 <sup>0</sup>	48.23 <sup>71</sup>	97.38 <sup>142</sup>	9.003 <sup>75</sup>	20.38 <sup>73</sup>	34.952 <sup>144</sup>	100.46 <sup>151</sup>
36.1	12.926	44.68	47.52	95.96	8.928	21.11	34.808	98.95
Mean Place	9.299	62.09	49.232	55.01	5.504	44.30	32.103	64.45
Sec $\delta$ , Tan $\delta$	1.072	-0.386	4.078	+3.953	1.000	-0.009	1.280	+0.799
$D\psi\alpha$ , $D_\omega\alpha$	+0.06	+0.02	+0.02	-0.24	+0.06	0.00	+0.05	-0.05
$D\psi\delta$ , $D_\omega\delta$	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4	+0.4	-0.4

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Piscis Australis. Mag. 4.2			$\zeta$ Pegasi. Mag. 3.6			$\beta$ Gruis. Mag. 2.2			$\eta$ Pegasi. Mag. 3.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m	s	° '	h m	s	° '	h m	s	° '	h m	s	° '
	22 36		-27 28	22 37		+10 23	22 37		-47 18	22 39		+29 47
Jan. 1.2	4.445		41.72	19.577		58.55	43.390		77.70	6.608		24.74
11.1	4.371	74	41.32 40	19.508	69	57.49 106	43.263	127	76.45 125	6.506	102	23.19 153
21.1	4.321	50	40.66 66	19.458	50	56.37 112	43.172	91	74.84 161	6.428	78	21.44 175
31.1	4.299	22	39.78 88	19.433	25	55.25 112	43.120	52	72.91 193	6.376	52	19.53 191
Feb. 10.1	4.307	8	38.67 111	19.434	1	54.18 107	43.110	10	70.70 221	6.356	20	17.55 198
		41	133		31	96		34			16	17.55 185
20.0	4.348		37.34	19.465		53.22	43.144		68.28	6.372		15.60
Mar. 2.0	4.422	74	35.82 152	19.527	62	52.43 79	43.222	78	65.66 262	6.426	54	13.75 185
12.0	4.531	109	34.11 171	19.623	96	51.85 58	43.346	124	62.92 274	6.520	94	12.11 164
21.9	4.675	144	32.25 186	19.755	132	51.55 30	43.517	171	60.11 281	6.657	137	10.73 138
31.9	4.856	181	30.26 199	19.922	167	51.54 1	43.734	217	57.27 284	6.836	179	9.72 101
		217	210		202	33		262			219	9.72 62
Apr. 10.9	5.073		28.16	20.124		51.87	43.996		54.47	7.055		9.10
20.9	5.324	251	26.00 216	20.358	234	52.54 67	44.299	303	51.76 271	7.312	257	8.92 15
30.8	5.605	281	23.82 218	20.622	264	53.53 99	44.641	342	49.20 256	7.600	288	9.19 27
May 10.8	5.912	307	21.67 215	20.909	287	54.85 132	45.015	374	46.83 237	7.915	315	9.91 72
20.8	6.239	327	19.60 207	21.215	306	56.45 160	45.414	399	44.73 210	8.248	333	11.07 116
		339	195		315	184		415			344	11.07 157
30.8	6.578		17.65	21.530		58.29	45.829		42.93	8.592		12.64
June 9.7	6.923	345	15.87 178	21.849	319	60.31 202	46.250	421	41.46 147	8.937	345	14.56 192
19.7	7.264	341	14.33 154	22.163	314	62.49 218	46.668	418	40.38 108	9.275	338	16.80 224
29.7	7.594	330	13.04 129	22.462	299	64.74 225	47.071	403	39.71 24	9.597	322	19.28 248
July 9.6	7.902	308	12.03 101	22.742	280	67.01 227	47.450	379	39.47 67	9.894	297	21.96 268
		280	69		251	224		344			265	21.96 279
19.6	8.182		11.34	22.993		69.25	47.794		39.64	10.159		24.75
29.6	8.426	244	10.98 5	23.210	217	71.40 215	48.094	300	40.22 58	10.387	228	27.60 285
Aug. 8.6	8.628	202	10.93 112	23.389	179	73.44 204	48.341	247	41.17 95	10.574	187	30.44 284
18.5	8.785	157	11.19 26	23.528	139	75.31 187	48.530	189	42.48 131	10.716	142	33.21 277
28.5	8.893	108	11.71 52	23.624	96	76.98 167	48.659	129	44.08 160	10.811	95	35.86 265
		60	78		53	146		66			49	35.86 249
Sept. 7.5	8.953		12.49	23.677		78.44	48.725		45.88	10.860		38.35
17.5	8.966	13	13.46 97	23.690	13	79.67 123	48.727	2	47.83 195	10.866	6	40.63 228
27.4	8.935	31	14.58 112	23.666	24	80.66 99	48.672	55	49.84 201	10.832	34	42.65 202
Oct. 7.4	8.865	70	15.77 119	23.611	55	81.40 74	48.565	107	51.83 199	10.762	70	44.39 174
17.4	8.764	101	16.97 120	23.529	82	81.91 51	48.414	151	53.70 187	10.664	98	45.83 144
		126	116		102	26		185			123	45.83 109
27.3	8.638		18.13	23.427		82.17	48.229		55.36	10.541		46.92
Nov. 6.3	8.497	141	19.19 106	23.310	117	82.22 5	48.018	211	56.76 140	10.402	139	47.66 74
16.3	8.348	149	20.11 92	23.188	122	82.03 19	47.794	224	57.82 106	10.253	149	48.04 38
26.3	8.198	150	20.83 72	23.063	125	81.65 38	47.568	226	58.50 68	10.099	154	48.05 1
Dec. 6.2	8.054	144	21.34 51	22.941	122	81.08 57	47.348	220	58.76 26	9.947	152	47.67 38
		132	26		112	76		203			145	47.67 74
16.2	7.922		21.60	22.829		80.32	47.145		58.60	9.802		46.93
26.2	7.808	114	21.63 3	22.729	100	79.43 89	46.965	180	58.02 58	9.668	134	45.84 109
36.2	7.715	93	21.39 24	22.645	84	78.41 102	46.814	151	57.03 99	9.551	117	44.44 140
Mean Place	4.046		37.50	19.326		51.67	43.040		68.97	6.566		12.05
Sec $\delta$ , Tan $\delta$	1.127		-0.520	1.017		+0.184	1.475		-1.084	1.152		+0.572
$D\psi \alpha$ , $D\omega \alpha$	+0.07		+0.03	+0.06		-0.01	+0.07		+0.07	+0.06		-0.04
$D\psi \delta$ , $D\omega \delta$	+0.4		-0.4	+0.4		-0.4	+0.4		-0.4	+0.4		-0.3

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\lambda$ Pegasi. Mag. 4.1			$\epsilon$ Gruis. Mag. 3.7			$\tau$ Aquarii. Mag. 4.2			$\mu$ Pegasi. Mag. 3.7		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h	m	" ' "	h	m	" ' "	h	m	" ' "	h	m	" ' "
	22	42	+23 7	22	43	-51 44	22	45	-14 1	22	45	+24 9
	s		"	s		"	s		"	s		"
Jan. 1.2	32.038		53.67	33.185		82.36	12.378		51.86	59.914		58.15
11.1	31.948	90	52.29 138	33.030	155	80.98 138	12.310	68	52.04 18	59.820	94	56.77 138
21.1	31.880	68	50.75 154	32.914	116	79.21 177	12.262	48	52.07 3	59.748	72	55.22 155
31.1	31.836	44	49.09 166	32.840	74	77.09 212	12.238	24	51.94 13	59.700	48	53.54 108
Feb. 10.1	31.822	14	47.41 168	32.813	27	74.68 241	12.239	1	51.61 33	59.682	18	51.84 170
		18	162		20	265		30	51		15	166
20.0	31.840		45.79	32.833		72.03	12.269		51.10	59.697		50.18
Mar. 2.0	31.893	53	44.28 151	32.903	70	69.21 282	12.329	60	50.38 72	59.745	48	48.63 155
12.0	31.983	90	42.99 129	33.023	120	66.27 204	12.420	91	49.46 92	59.833	88	47.27 136
21.9	32.113	130	41.96 103	33.194	171	63.26 301	12.548	128	48.32 114	59.960	127	46.19 108
31.9	32.282	169	41.27 69	33.416	222	60.25 301	12.709	161	46.99 133	60.127	167	45.44 75
		208	31		272	296		196	153		206	39
Apr. 10.9	32.490		40.96	33.688		57.29	12.905		45.46	60.333		45.05
20.9	32.733	243	41.05 9	34.005	317	54.44 285	13.133	228	43.75 171	60.574	241	45.08 3
30.8	33.007	274	41.55 50	34.365	360	51.77 267	13.393	260	41.92 183	60.847	273	45.53 45
May 10.8	33.307	300	42.46 91	34.761	396	49.33 244	13.676	283	39.98 194	61.147	300	46.38 85
20.8	33.626	319	43.76 130	35.183	422	47.18 215	13.980	304	37.98 200	61.466	319	47.64 126
		330	166		442	181		318	200		332	162
30.8	33.956		45.42	35.625		45.37	14.298		35.98	61.798		49.26
June 9.7	34.289	333	47.37 195	36.076	451	43.93 144	14.621	323	34.02 196	62.133	335	51.18 192
19.7	34.616	327	49.59 222	36.524	448	42.91 102	14.942	321	32.16 186	62.463	330	53.38 220
29.7	34.928	312	52.00 241	36.959	435	42.32 59	15.252	310	30.45 171	62.779	316	55.78 240
July 9.6	35.219	291	54.56 256	37.367	408	42.18 14	15.545	293	28.92 153	63.073	294	58.34 256
		261	261		373	31		265	133		265	264
19.6	35.480		57.17	37.740		42.49	15.810		27.59	63.338		60.98
29.6	35.706	226	59.80 263	38.066	326	43.22 73	16.044	234	26.54 105	63.569	231	63.63 265
Aug. 8.6	35.893	187	62.38 258	38.337	271	44.36 114	16.239	195	25.74 80	63.760	191	66.24 261
18.5	36.037	144	64.87 249	38.547	210	45.84 148	16.394	155	25.20 54	63.907	147	68.77 253
28.5	36.137	106	67.22 235	38.690	143	47.63 179	16.504	110	24.94 26	64.010	103	71.17 240
		55	215		75	200		66	2		60	222
Sept. 7.5	36.192		69.37	38.765		49.63	16.570		24.92	64.070		73.39
17.5	36.206	14	71.31 194	38.771	6	51.79 216	16.594	24	25.14 22	64.087	17	75.38 199
27.4	36.181	25	73.00 169	38.714	57	53.99 220	16.579	15	25.54 40	64.066	21	77.13 175
Oct. 7.4	36.122	59	74.43 143	38.599	115	56.14 215	16.529	50	26.09 55	64.011	55	78.62 149
17.4	36.036	86	75.56 113	38.434	165	58.17 203	16.449	80	26.76 67	63.926	85	79.80 118
		110	83		206	180		101	75		107	90
27.3	35.926		76.39	38.228		59.97	16.348		27.51	63.819		80.70
Nov. 6.3	35.802	124	76.91 52	37.994	234	61.46 149	16.230	118	28.27 76	63.694	125	81.27 57
16.3	35.668	134	77.11 20	37.743	251	62.59 113	16.105	125	29.02 75	63.560	134	81.51 24
26.3	35.529	139	76.98 13	37.486	257	63.30 71	15.978	127	29.72 70	63.421	139	81.42 9
Dec. 6.2	35.392	137	76.55 43	37.234	252	63.56 26	15.855	123	30.35 63	63.283	138	81.02 40
		130	74		236	20		113	54		133	71
16.2	35.262		75.81	36.998		63.36	15.742		30.89	63.150		80.31
26.2	35.143	119	74.79 102	36.786	212	62.69 67	15.640	102	31.31 42	63.029	121	79.31 100
36.2	35.039	104	73.52 127	36.605	181	61.58 111	15.556	84	31.58 27	62.922	107	78.04 127
Mean Place	31.883		42.77	32.835		72.77	11.957		51.42	59.749		46.83
Sec $\delta$ , Tan $\delta$	1.087		+0.427	1.615		-1.269	1.031		-0.250	1.096		+0.449
$D\phi\alpha$ , $D\omega\alpha$	+0.06		-0.03	+0.07		+0.08	+0.06		+0.02	+0.06		-0.03
$D\phi\delta$ , $D\omega\delta$	+0.4		-0.3	+0.4		-0.3	+0.4		-0.3	+0.4		-0.3

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Cephei. Mag. 3.7		$\lambda$ Aquarii. Mag. 3.8		$\rho$ Indi. Mag. 6.1		$\delta$ Aquarii. Mag. 3.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 22 46	° ' " +65 45	h m 22 48	° ' " - 8 0	h m 22 48	° ' " -70 30	h m 22 50	° ' " -16 15
	s	"	s	"	s	"	s	"
Jan. 1.2	42.05	70.14	17.530	76.29	53.93	75.09	15.260	46.16
11.1	41.69	68.48	17.461	76.70	53.54	73.05	15.187	46.27
21.1	41.38	66.34	17.411	77.01	53.23	70.55	15.133	46.21
31.1	41.12	63.80	17.384	77.19	53.01	67.68	15.103	45.95
Feb. 10.1	40.95	60.98	17.381	77.22	52.88	64.50	15.098	45.51
20.0	40.86	57.99	17.407	77.07	52.84	61.11	15.122	44.86
Mar. 2.0	40.86	54.95	17.463	76.73	52.89	57.55	15.176	44.01
12.0	40.96	51.98	17.550	76.18	53.04	53.94	15.264	42.95
22.0	41.17	49.22	17.672	75.39	53.30	50.35	15.386	41.67
31.9	41.46	46.77	17.829	74.37	53.64	46.85	15.544	40.20
Apr. 10.9	41.84	44.73	18.019	73.11	54.07	43.50	15.736	38.55
20.9	42.30	43.18	18.243	71.66	54.58	40.39	15.963	36.75
30.8	42.82	42.16	18.497	70.00	55.17	37.56	16.220	34.82
May 10.8	43.38	41.73	18.777	68.19	55.82	35.10	16.503	32.81
20.8	43.98	41.89	19.077	66.27	56.51	33.04	16.809	30.77
30.8	44.59	42.63	19.390	64.29	57.24	31.43	17.128	28.74
June 9.7	45.20	43.93	19.709	62.28	57.99	30.31	17.454	26.77
19.7	45.79	45.76	20.026	60.32	58.73	29.70	17.778	24.92
29.7	46.35	48.07	20.331	58.44	59.45	29.61	18.093	23.25
July 9.7	46.85	50.79	20.620	56.69	60.12	30.06	18.389	21.77
19.6	47.30	53.87	20.882	55.13	60.74	31.00	18.660	20.53
29.6	47.67	57.21	21.114	53.77	61.28	32.42	18.900	19.55
Aug. 8.6	47.97	60.77	21.308	52.65	61.73	34.26	19.101	18.86
18.5	48.18	64.44	21.461	51.77	62.07	36.46	19.261	18.44
28.5	48.30	68.16	21.572	51.15	62.29	38.94	19.377	18.30
Sept. 7.5	48.34	71.86	21.640	50.76	62.39	41.61	19.449	18.41
17.5	48.30	75.45	21.667	50.62	62.38	44.37	19.477	18.76
27.4	48.18	78.86	21.655	50.68	62.23	47.11	19.465	19.30
Oct. 7.4	47.99	82.02	21.610	50.93	61.97	49.72	19.419	19.99
17.4	47.72	84.88	21.536	51.32	61.62	52.10	19.342	20.77
27.4	47.40	87.34	21.442	51.82	61.19	54.13	19.242	21.61
Nov. 6.3	47.04	89.35	21.332	52.40	60.69	55.74	19.125	22.45
16.3	46.64	90.87	21.212	53.03	60.15	56.85	19.000	23.26
26.3	46.21	91.83	21.090	53.68	59.59	57.41	18.871	24.00
Dec. 6.2	45.77	92.23	20.973	54.31	59.02	57.38	18.746	24.65
16.2	45.33	92.03	20.862	54.92	58.49	56.78	18.629	25.17
26.2	44.91	91.24	20.763	55.48	57.99	55.60	18.524	25.56
36.2	44.51	89.89	20.679	55.97	57.55	53.87	18.435	25.78
Mean Place	43.309	48.98	17.113	77.70	53.950	63.03	14.807	45.11
Sec $\delta$ , Tan $\delta$	2.436	+2.222	1.010	-0.141	2.998	-2.826	1.042	-0.292
$D\psi a$ , $D_{\omega} a$	+0.04	-0.14	+0.06	+0.01	+0.08	+0.18	+0.06	+0.02
$- \delta$ , $D_{\omega} \delta$	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\alpha$ Piscis Australis. (Fomalhaut.) Mag. 1.3		$\circ$ Andromedæ. Mag. 3.6		$\beta$ Pegasi. Var. 2.2-2.7		$\alpha$ Pegasi. (Markab.) Mag. 2.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m	° '	h m	° '	h m	° '	h m	° '
	22 53	-30 3	22 58	+41 52	22 59	+27 37	23 0	+14 45
	s	"	s	"	s	"	s	"
Jan. 1.2	4.533	49.89	5.883	63.49	45.122	69.11	37.852	39.34
11.1	4.441	49.47	5.730	61.94	45.014	67.76	37.765	38.24
21.1	4.374	48.75	5.601	60.07	44.925	66.18	37.696	37.04
31.1	4.332	47.78	5.501	57.93	44.861	64.46	37.647	35.80
Feb. 10.1	4.320	46.54	5.438	55.62	44.825	62.66	37.624	34.57
20.0	4.340	45.08	5.417	53.24	44.821	60.87	37.629	33.42
Mar. 2.0	4.394	43.39	5.441	50.89	44.854	59.17	37.667	32.39
12.0	4.483	41.52	5.514	48.69	44.926	57.63	37.739	31.57
22.0	4.610	39.49	5.639	46.71	45.040	56.35	37.848	31.00
31.9	4.776	37.31	5.815	45.05	45.197	55.38	37.995	30.73
Apr. 10.9	4.980	35.04	6.041	43.79	45.395	54.79	38.179	30.79
20.9	5.221	32.72	6.313	42.98	45.631	54.60	38.400	31.19
30.8	5.494	30.38	6.625	42.66	45.903	54.84	38.654	31.95
May 10.8	5.797	28.09	6.970	42.84	46.205	55.51	38.934	33.06
20.8	6.123	25.91	7.338	43.53	46.528	56.59	39.237	34.48
30.8	6.465	23.86	7.721	44.71	46.865	58.06	39.554	36.19
June 9.7	6.817	22.00	8.108	46.33	47.208	59.88	39.877	38.13
19.7	7.167	20.40	8.490	48.37	47.549	62.01	40.199	40.27
29.7	7.507	19.07	8.856	50.75	47.877	64.38	40.510	42.53
July 9.7	7.831	18.06	9.196	53.43	48.184	66.93	40.803	44.86
19.6	8.127	17.39	9.503	56.33	48.464	69.60	41.071	47.21
29.6	8.389	17.07	9.771	59.40	48.709	72.33	41.309	49.52
Aug. 8.6	8.610	17.08	9.993	62.55	48.916	75.05	41.509	51.74
18.5	8.787	17.44	10.166	65.73	49.080	77.72	41.669	53.82
28.5	8.915	18.09	10.289	68.86	49.199	80.27	41.788	55.74
Sept. 7.5	8.994	19.00	10.360	71.87	49.274	82.67	41.865	57.46
17.5	9.024	20.14	10.382	74.74	49.306	84.87	41.901	58.96
27.4	9.010	21.42	10.358	77.38	49.298	86.84	41.900	60.21
Oct. 7.4	8.955	22.78	10.293	79.76	49.254	88.54	41.865	61.23
17.4	8.864	24.17	10.191	81.82	49.179	89.96	41.801	61.98
27.4	8.746	25.51	10.059	83.54	49.080	91.06	41.714	62.50
Nov. 6.3	8.610	26.73	9.902	84.86	48.960	91.84	41.611	62.75
16.3	8.461	27.80	9.728	85.77	48.828	92.28	41.495	62.77
26.3	8.309	28.66	9.543	86.22	48.688	92.37	41.374	62.53
Dec. 6.2	8.159	29.26	9.353	86.22	48.546	92.11	41.252	62.07
16.2	8.017	29.60	9.165	85.76	48.406	91.50	41.135	61.39
26.2	7.891	29.66	8.984	84.85	48.274	90.58	41.024	60.53
36.2	7.782	29.42	8.816	83.52	48.155	89.37	40.925	59.50
Mean Place	4.049	44.98	5.916	46.70	44.908	56.23	37.503	30.41
Sec $\delta$ , Tan $\delta$	1.155	-0.579	1.343	+0.897	1.129	+0.524	1.034	+0.264
$D\psi\alpha$ , $D\omega\alpha$	+0.06	+0.04	+0.05	-0.06	+0.06	-0.03	+0.06	-0.02
$D\psi\delta$ , $D\omega\delta$	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3	+0.4	-0.3



FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	55 Pegasi. Mag. 4.7			c <sup>2</sup> Aquarii. Mag. 3.8			π Cephei. Mag. 4.6			ι Gruis. Mag. 4.1		
	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.	Right Ascension.		Declina- tion.
	h m 23 2	s	° ' " + 8 57	h m 23 5	s	° ' " - 21 36	h m 23 5	s	° ' " + 74 56	h m 23 5	s	° ' " - 45 4
Jan. 1.2	49.746	82	46.07 93	1.916	89	86.19 5	13.10	68	42.50	40.447	149	56.35 9
11.2	49.664	65	45.14 99	1.827	68	86.14 29	12.42	60	41.18 132	40.293	118	55.39 13
21.1	49.599	45	44.15 96	1.759	46	85.85 51	11.82	50	39.31 233	40.180	85	54.02 17
31.1	49.554	20	43.17 94	1.713	21	85.34 74	11.32	39	36.98 271	40.095	49	52.30 20
Feb. 10.1	49.534	6	42.23 84	1.692	7	84.60 96	10.93	24	34.27 296	40.046	9	50.27 23
20.0	49.540	37	41.39 67	1.699	39	83.64 119	10.69	10	31.31 311	40.037	34	47.97 25
Mar. 2.0	49.577	71	40.72 48	1.738	73	82.45 140	10.59	6	28.20 311	40.071	78	45.43 27
12.0	49.648	104	40.24 22	1.811	108	81.05 161	10.65	22	25.09 298	40.149	125	42.73 28
22.0	49.752	144	40.02 5	1.919	144	79.44 178	10.87	36	22.11 275	40.274	171	39.91 28
31.9	49.896	180	40.07 36	2.063	183	77.66 193	11.23	51	19.36 240	40.445	218	37.01 28
Apr. 10.9	50.076	215	40.43 68	2.246	218	75.73 206	11.74	65	16.96 196	40.663	263	34.11 28
20.9	50.291	247	41.11 99	2.464	252	73.67 215	12.39	74	15.00 145	40.926	304	31.25 28
30.9	50.538	274	42.10 130	2.716	280	71.52 219	13.13	82	13.55 88	41.230	341	28.49 28
May 10.8	50.812	297	43.40 157	2.996	306	69.33 218	13.95	88	12.67 31	41.571	370	25.91 28
20.8	51.109	311	44.97 179	3.302	322	67.15 210	14.83	91	12.36 28	41.941	393	23.54 28
30.8	51.420	318	46.76 197	3.624	331	65.05 200	15.74	92	12.64 87	42.334	405	21.45 1
June 9.7	51.738	318	48.73 212	3.955	333	63.05 184	16.66	89	13.51 144	42.739	408	19.69 1
19.7	52.056	307	50.85 219	4.288	327	61.21 162	17.55	85	14.95 195	43.147	401	18.28 1
29.7	52.363	292	53.04 220	4.615	310	59.59 138	18.40	78	16.90 242	43.548	383	17.29 1
July 9.7	52.655	267	55.24 218	4.925	287	58.21 108	19.18	68	19.32 282	43.931	355	16.72 1
19.6	52.922	238	57.42 209	5.212	255	57.13 78	19.86	60	22.14 318	44.286	317	16.59 1
29.6	53.160	202	59.51 197	5.467	219	56.35 48	20.46	48	25.32 345	44.603	271	16.88 1
Aug. 8.6	53.362	162	61.48 181	5.686	178	55.87 15	20.94	36	28.77 364	44.874	219	17.59 1
18.6	53.524	121	63.29 160	5.864	133	55.72 15	21.30	24	32.41 377	45.093	162	18.69 1
28.5	53.645	80	64.89 140	5.997	88	55.87 41	21.54	9	36.18 381	45.255	102	20.11 1
Sept. 7.5	53.725	40	66.29 116	6.085	44	56.28 66	21.63	2	39.99 378	45.357	41	21.82 1
17.5	53.765	3	67.45 94	6.129	2	56.94 84	21.61	15	43.77 366	45.398	16	23.73 1
27.4	53.768	32	68.39 68	6.131	37	57.78 99	21.46	28	47.43 348	45.382	99	25.75 1
Oct. 7.4	53.736	60	69.07 47	6.094	69	58.77 107	21.18	37	50.91 322	45.313	115	27.81 1
17.4	53.676	83	69.54 23	6.025	95	59.84 109	20.81	48	54.13 287	45.198	154	29.82 1
27.4	53.593	99	69.77 3	5.930	115	60.93 107	20.33	56	57.00 246	45.044	182	31.68 1
Nov. 6.3	53.494	111	69.80 17	5.815	126	62.00 99	19.77	64	59.46 199	44.862	202	33.31 1
16.3	53.383	116	69.63 36	5.689	133	62.99 87	19.13	69	61.45 144	44.660	213	34.66 1
26.3	53.267	117	69.27 53	5.556	132	63.86 71	18.44	74	62.89 87	44.447	211	35.64 1
Dec. 6.3	53.150	113	68.74 68	5.424	126	64.57 53	17.70	75	63.76 26	44.236	205	36.22 1
16.2	53.037	106	68.06 81	5.298	116	65.10 31	16.95	74	64.02 36	44.031	190	36.38 1
26.2	52.931	94	67.25 91	5.182	102	65.41 10	16.21	71	63.66 97	43.841	167	36.11 1
36.2	52.837		66.34	5.080		65.51	15.50		62.69	43.674		35.41 1
Mean Place	49.342		38.97	1.376		83.65	15.234		19.07	39.922		47.69
Sec δ, Tan δ	1.012		+0.158	1.076		-0.396	3.850		+3.718	1.432		-1.02
Dδ a, D <sub>m</sub> a	+0.06		-0.01	+0.06		+0.03	+0.04		-0.24	+0.07		+0.07
δ, D <sub>m</sub> δ	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2	+0.4		-0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	59 Pegasi. Mag. 5.2		5 H <sup>1</sup> . Cassiopeiae. Mag. 5.6		φ Aquarii. Mag. 4.4		ψ Aquarii. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 7	° ' " + 8 16	h m 23 9	° ' " +56 42	h m 23 10	° ' " - 6 29	h m 23 11	° ' " - 9 31
	s	"	s	"	s	"	s	"
Jan. 1.2	33.156	16.17	16.539	56.74	1.974	45.88	33.208	82.75
11.2	33.072	15.26	16.287	55.29	1.893	46.35	33.126	83.14
21.1	33.005	14.32	16.066	53.40	1.826	46.73	33.061	83.38
31.1	32.956	13.37	15.885	51.13	1.782	46.99	33.015	83.49
Feb. 10.1	32.932	12.48	15.754	48.57	1.760	47.11	32.992	83.43
20.0	32.933	11.69	15.681	45.84	1.762	47.05	32.994	83.18
Mar. 2.0	32.966	11.06	15.675	43.05	1.795	46.79	33.027	82.74
12.0	33.032	10.63	15.737	40.31	1.861	46.30	33.082	82.07
22.0	33.134	10.44	15.873	37.76	1.959	45.61	33.189	81.18
31.9	33.271	10.54	16.079	35.48	2.094	44.66	33.324	80.05
Apr. 10.9	33.447	10.92	16.355	33.57	2.265	43.48	33.496	78.71
20.9	33.658	11.63	16.694	32.11	2.473	42.07	33.702	77.16
30.9	33.901	12.65	17.087	31.17	2.712	40.44	33.940	75.43
May 10.8	34.172	13.95	17.525	30.76	2.979	38.68	34.209	73.65
20.8	34.466	15.53	17.995	30.91	3.270	36.78	34.500	71.57
30.8	34.776	17.32	18.486	31.61	3.577	34.77	34.809	69.53
June 9.7	35.094	19.28	18.983	32.84	3.894	32.74	35.127	67.49
19.7	35.412	21.39	19.473	34.58	4.212	30.72	35.447	65.49
29.7	35.721	23.57	19.942	36.77	4.524	28.78	35.762	63.58
July 9.7	36.015	25.77	20.381	39.35	4.819	26.96	36.061	61.82
19.6	36.284	27.92	20.778	42.27	5.092	25.30	36.339	60.26
29.6	36.525	29.98	21.126	45.45	5.338	23.81	36.587	58.91
Aug. 8.6	36.730	31.92	21.417	48.81	5.547	22.57	36.801	57.81
18.6	36.897	33.69	21.647	52.31	5.719	21.59	36.977	56.96
28.5	37.023	35.26	21.812	55.85	5.852	20.84	37.111	56.40
Sept. 7.5	37.108	36.62	21.912	59.35	5.940	20.39	37.204	56.10
17.5	37.153	37.74	21.948	62.77	5.990	20.14	37.255	56.03
27.4	37.160	38.64	21.923	66.02	5.999	20.11	37.266	56.20
Oct. 7.4	37.133	39.29	21.842	69.04	5.976	20.30	37.242	56.55
17.4	37.078	39.72	21.709	71.78	5.921	20.67	37.189	57.05
27.4	36.999	39.93	21.531	74.15	5.844	21.16	37.110	57.67
Nov. 6.3	36.903	39.94	21.315	76.11	5.745	21.72	37.014	58.37
16.3	36.795	39.74	21.070	77.62	5.637	22.36	36.905	59.10
26.3	36.681	39.38	20.801	78.62	5.524	23.03	36.789	59.83
Dec. 6.3	36.565	38.86	20.520	79.09	5.408	23.71	36.673	60.52
16.2	36.452	38.18	20.233	79.01	5.295	24.38	36.560	61.17
26.2	36.347	37.39	19.951	78.38	5.192	25.01	36.455	61.74
36.2	36.252	36.51	19.682	77.23	5.098	25.57	36.361	62.22
Mean Place	32.720	9.18	16.897	35.99	1.450	48.06	32.666	83.99
Sec δ, Tan δ	1.011	+0.145	1.822	+1.523	1.006	-0.114	1.014	-0.168
D <sub>φ</sub> α, D <sub>α</sub> α	+0.06	-0.01	+0.05	-0.10	+0.06	+0.01	+0.06	+0.01
D <sub>φ</sub> δ, D <sub>α</sub> δ	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Tucane. Mag. 4.1		$\gamma$ Piscium. Mag. 3.8		$\gamma$ Sculptoris. Mag. 4.5		$\alpha$ Cephei. Mag. 4.9	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 12	° ' " -58 40	h m 23 12	° ' " + 2 49	h m 23 14	° ' " -32 58	h m 23 15	° ' " +67 39
	s	"	s	"	s	"	s	"
Jan. 1.2	36.035	99.83	52.229	48.24	21.281	69.56	11.75	49.02
11.2	35.791 <sup>244</sup>	98.44 <sup>139</sup>	52.147 <sup>82</sup>	47.49 <sup>75</sup>	21.168 <sup>113</sup>	69.14 <sup>42</sup>	11.32 <sup>43</sup>	47.73 <sup>129</sup>
21.1	35.588 <sup>203</sup>	96.59 <sup>185</sup>	52.081 <sup>66</sup>	46.75 <sup>74</sup>	21.075 <sup>93</sup>	68.39 <sup>75</sup>	10.93 <sup>39</sup>	45.92 <sup>181</sup>
31.1	35.431 <sup>157</sup>	94.33 <sup>226</sup>	52.033 <sup>48</sup>	46.07 <sup>68</sup>	21.008 <sup>67</sup>	67.34 <sup>105</sup>	10.60 <sup>33</sup>	43.66 <sup>226</sup>
Feb. 10.1	35.326 <sup>105</sup>	91.72 <sup>261</sup>	52.008 <sup>25</sup>	45.47 <sup>60</sup>	20.967 <sup>41</sup>	66.00 <sup>134</sup>	10.35 <sup>25</sup>	41.03 <sup>263</sup>
	49	288	0	48	8	161	16	286
20.1	35.277	88.84	52.008	44.99	20.959	64.39	10.19	38.17
Mar. 2.0	35.285 <sup>8</sup>	85.72 <sup>312</sup>	52.038 <sup>30</sup>	44.70 <sup>29</sup>	20.985 <sup>26</sup>	62.55 <sup>184</sup>	10.12 <sup>7</sup>	35.18 <sup>289</sup>
12.0	35.354 <sup>69</sup>	82.46 <sup>326</sup>	52.100 <sup>62</sup>	44.59 <sup>11</sup>	21.048 <sup>63</sup>	60.49 <sup>206</sup>	10.16 <sup>4</sup>	32.19 <sup>289</sup>
22.0	35.485 <sup>131</sup>	79.12 <sup>334</sup>	52.197 <sup>97</sup>	44.74 <sup>15</sup>	21.150 <sup>102</sup>	58.26 <sup>223</sup>	10.30 <sup>14</sup>	29.31 <sup>288</sup>
31.9	35.680 <sup>195</sup>	75.77 <sup>335</sup>	52.331 <sup>134</sup>	45.14 <sup>40</sup>	21.291 <sup>141</sup>	55.89 <sup>237</sup>	10.55 <sup>25</sup>	26.68 <sup>263</sup>
	255	331	170	69	183	246	35	228
Apr. 10.9	35.935	72.46	52.501	45.83	21.474	53.43	10.90	24.40
20.9	36.249 <sup>314</sup>	69.28 <sup>318</sup>	52.707 <sup>206</sup>	46.78 <sup>95</sup>	21.697 <sup>223</sup>	50.91 <sup>252</sup>	11.34 <sup>44</sup>	22.54 <sup>186</sup>
30.9	36.617 <sup>368</sup>	66.29 <sup>299</sup>	52.945 <sup>238</sup>	48.02 <sup>124</sup>	21.957 <sup>280</sup>	48.39 <sup>252</sup>	11.85 <sup>61</sup>	21.18 <sup>126</sup>
May 10.8	37.033 <sup>416</sup>	63.55 <sup>274</sup>	53.213 <sup>268</sup>	49.50 <sup>148</sup>	22.251 <sup>294</sup>	45.92 <sup>247</sup>	12.43 <sup>58</sup>	20.36 <sup>82</sup>
20.8	37.490 <sup>457</sup>	61.12 <sup>243</sup>	53.503 <sup>290</sup>	51.20 <sup>170</sup>	22.571 <sup>320</sup>	43.56 <sup>236</sup>	13.06 <sup>63</sup>	20.11 <sup>5</sup>
	457	206	309	188	341	219	65	34
30.8	37.977	59.06	53.812	53.08	22.912	41.37	13.71	20.45
June 9.8	38.482 <sup>505</sup>	57.42 <sup>164</sup>	54.128 <sup>316</sup>	55.08 <sup>200</sup>	23.267 <sup>355</sup>	39.38 <sup>199</sup>	14.37 <sup>66</sup>	21.37 <sup>82</sup>
19.7	38.993 <sup>511</sup>	56.23 <sup>119</sup>	54.447 <sup>319</sup>	57.15 <sup>207</sup>	23.625 <sup>358</sup>	37.67 <sup>171</sup>	15.02 <sup>65</sup>	22.82 <sup>146</sup>
29.7	39.498 <sup>505</sup>	55.52 <sup>71</sup>	54.758 <sup>311</sup>	59.26 <sup>211</sup>	23.976 <sup>351</sup>	36.26 <sup>141</sup>	15.65 <sup>63</sup>	24.78 <sup>196</sup>
July 9.7	39.981 <sup>483</sup>	55.30 <sup>22</sup>	55.054 <sup>296</sup>	61.32 <sup>206</sup>	24.314 <sup>338</sup>	35.20 <sup>106</sup>	16.23 <sup>58</sup>	27.19 <sup>261</sup>
	450	29	274	199	814	69	53	280
19.6	40.431	55.59	55.328	63.31	24.628	34.51	16.76	29.99
29.6	40.835 <sup>404</sup>	56.36 <sup>77</sup>	55.573 <sup>245</sup>	65.18 <sup>187</sup>	24.911 <sup>283</sup>	34.19 <sup>32</sup>	17.22 <sup>46</sup>	33.14 <sup>315</sup>
Aug. 8.6	41.181 <sup>346</sup>	57.58 <sup>122</sup>	55.784 <sup>211</sup>	66.86 <sup>168</sup>	25.155 <sup>244</sup>	34.24 <sup>5</sup>	17.61 <sup>39</sup>	36.53 <sup>339</sup>
18.6	41.460 <sup>279</sup>	59.21 <sup>163</sup>	55.958 <sup>174</sup>	68.36 <sup>150</sup>	25.355 <sup>200</sup>	34.66 <sup>42</sup>	17.90 <sup>29</sup>	40.11 <sup>328</sup>
28.5	41.666 <sup>206</sup>	61.19 <sup>198</sup>	56.090 <sup>132</sup>	69.63 <sup>127</sup>	25.507 <sup>152</sup>	35.42 <sup>76</sup>	18.11 <sup>21</sup>	43.80 <sup>369</sup>
	127	226	93	104	103	105	12	372
Sept. 7.5	41.793	63.45	56.183	70.67	25.610	36.47	18.23	47.52
17.5	41.840 <sup>47</sup>	65.88 <sup>243</sup>	56.235 <sup>52</sup>	71.47 <sup>80</sup>	25.663 <sup>53</sup>	37.76 <sup>129</sup>	18.27 <sup>4</sup>	51.20 <sup>268</sup>
27.5	41.810 <sup>30</sup>	68.40 <sup>252</sup>	56.249 <sup>14</sup>	72.05 <sup>58</sup>	25.669 <sup>6</sup>	39.22 <sup>146</sup>	18.22 <sup>5</sup>	54.75 <sup>355</sup>
Oct. 7.4	41.706 <sup>104</sup>	70.90 <sup>250</sup>	56.229 <sup>20</sup>	72.40 <sup>35</sup>	25.631 <sup>38</sup>	40.79 <sup>157</sup>	18.08 <sup>14</sup>	58.13 <sup>338</sup>
17.4	41.537 <sup>169</sup>	73.29 <sup>239</sup>	56.180 <sup>49</sup>	72.54 <sup>14</sup>	25.555 <sup>76</sup>	42.39 <sup>160</sup>	17.86 <sup>23</sup>	61.23 <sup>310</sup>
	225	216	73	5	108	156	28	277
27.4	41.312	75.45	56.107	72.49	25.447	43.95	17.58	64.00
Nov. 6.3	41.042 <sup>270</sup>	77.30 <sup>185</sup>	56.016 <sup>91</sup>	72.27 <sup>22</sup>	25.316 <sup>131</sup>	45.39 <sup>144</sup>	17.24 <sup>34</sup>	66.35 <sup>285</sup>
16.3	40.741 <sup>301</sup>	78.75 <sup>145</sup>	55.913 <sup>103</sup>	71.91 <sup>36</sup>	25.169 <sup>147</sup>	46.65 <sup>126</sup>	16.85 <sup>39</sup>	68.26 <sup>191</sup>
26.3	40.423 <sup>318</sup>	79.75 <sup>100</sup>	55.804 <sup>100</sup>	71.43 <sup>48</sup>	25.013 <sup>156</sup>	47.68 <sup>103</sup>	16.42 <sup>43</sup>	69.63 <sup>137</sup>
Dec. 6.3	40.099 <sup>324</sup>	80.25 <sup>50</sup>	55.692 <sup>112</sup>	70.84 <sup>59</sup>	24.855 <sup>158</sup>	48.43 <sup>75</sup>	15.96 <sup>46</sup>	70.44 <sup>81</sup>
	316	3	109	66	154	46	47	28
16.2	39.783	80.22	55.583	70.18	24.701	48.89	15.49	70.67
26.2	39.486 <sup>297</sup>	79.66 <sup>56</sup>	55.480 <sup>103</sup>	69.44 <sup>74</sup>	24.557 <sup>144</sup>	49.01 <sup>12</sup>	15.02 <sup>47</sup>	70.30 <sup>37</sup>
36.2	39.216 <sup>270</sup>	78.60 <sup>106</sup>	55.386 <sup>94</sup>	68.68 <sup>76</sup>	24.429 <sup>128</sup>	48.80 <sup>21</sup>	14.57 <sup>45</sup>	69.33 <sup>97</sup>
Mean Place	35.551	88.76	51.731	42.94	20.684	63.88	12.670	26.07
Sec $\delta$ , Tan $\delta$	1.924	-1.644	1.001	+0.049	1.192	-0.649	2.631	+2.434
$D\alpha$ , $D\alpha$	+0.07	+0.11	+0.06	0.00	+0.06	+0.04	+0.05	-0.16
$D\delta$ , $D\delta$	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\tau$ Pegasi. Mag. 4.6		$\delta^1$ Aquarii. Mag. 4.2		4 Cassiopeiae. Mag. 5.2		$\nu$ Pegasi. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 16	° ' " +23 17	h m 23 18	° ' " -20 32	h m 23 21	° ' " +61 49	h m 23 21	° ' " +22 56
Jan. 1.2	31.962	20.96	37.369	76.21	8.16	59.47	14.478	61.05
11.2	31.856 <sup>106</sup>	19.77 <sup>119</sup>	37.274 <sup>95</sup>	76.25 <sup>4</sup>	7.84 <sup>32</sup>	58.19 <sup>128</sup>	14.371 <sup>107</sup>	59.90 <sup>115</sup>
21.1	31.764 <sup>92</sup>	18.40 <sup>137</sup>	37.197 <sup>77</sup>	76.05 <sup>20</sup>	7.54 <sup>30</sup>	56.41 <sup>178</sup>	14.278 <sup>93</sup>	58.57 <sup>133</sup>
31.1	31.694 <sup>70</sup>	16.91 <sup>149</sup>	37.139 <sup>58</sup>	75.63 <sup>42</sup>	7.29 <sup>25</sup>	54.20 <sup>221</sup>	14.206 <sup>72</sup>	57.11 <sup>146</sup>
Feb. 10.1	31.647 <sup>47</sup>	15.35 <sup>156</sup>	37.105 <sup>34</sup>	74.97 <sup>66</sup>	7.09 <sup>20</sup>	51.66 <sup>254</sup>	14.156 <sup>50</sup>	55.59 <sup>152</sup>
	16	155	7	88	13	276	20	151
20.1	31.631	13.80	37.098	74.09	6.96	48.90	14.136	54.08
Mar. 2.0	31.648	12.34 <sup>146</sup>	37.122 <sup>24</sup>	72.96 <sup>113</sup>	6.91 <sup>5</sup>	46.02 <sup>288</sup>	14.150 <sup>14</sup>	52.65 <sup>143</sup>
12.0	31.703 <sup>55</sup>	11.04 <sup>130</sup>	37.179 <sup>57</sup>	71.63 <sup>133</sup>	6.94 <sup>3</sup>	43.15 <sup>287</sup>	14.199 <sup>49</sup>	51.39 <sup>126</sup>
22.0	31.796 <sup>98</sup>	9.98 <sup>106</sup>	37.270 <sup>91</sup>	70.08 <sup>155</sup>	7.06 <sup>12</sup>	40.40 <sup>275</sup>	14.288 <sup>89</sup>	50.34 <sup>105</sup>
31.9	31.932 <sup>136</sup>	9.21 <sup>77</sup>	37.400 <sup>130</sup>	68.34 <sup>174</sup>	7.26 <sup>20</sup>	37.91 <sup>249</sup>	14.419 <sup>131</sup>	49.58 <sup>76</sup>
	177	45	168	191	29	216	172	44
Apr. 10.9	32.109	8.76	37.568	66.43	7.55	35.75	14.591	49.14 <sup>6</sup>
20.9	32.326 <sup>217</sup>	8.70 <sup>6</sup>	37.772 <sup>204</sup>	64.38 <sup>206</sup>	7.90 <sup>35</sup>	34.02 <sup>173</sup>	14.804 <sup>213</sup>	49.08 <sup>6</sup>
30.9	32.580 <sup>254</sup>	9.04 <sup>34</sup>	38.010 <sup>238</sup>	62.23 <sup>215</sup>	8.32 <sup>42</sup>	32.78 <sup>124</sup>	15.054 <sup>250</sup>	49.41 <sup>33</sup>
May 10.8	32.863 <sup>283</sup>	9.77 <sup>73</sup>	38.280 <sup>270</sup>	60.03 <sup>220</sup>	8.80 <sup>48</sup>	32.07 <sup>71</sup>	15.334 <sup>280</sup>	50.13 <sup>72</sup>
20.8	33.172 <sup>309</sup>	10.88 <sup>111</sup>	38.577 <sup>297</sup>	57.82 <sup>221</sup>	9.32 <sup>52</sup>	31.92 <sup>15</sup>	15.641 <sup>307</sup>	51.23 <sup>110</sup>
	326	146	314	216	54	42	324	143
30.8	33.498	12.34	38.891	55.66	9.86	32.34	15.965	52.66
June 9.8	33.833 <sup>335</sup>	14.12 <sup>178</sup>	39.218 <sup>327</sup>	53.60 <sup>206</sup>	10.42 <sup>56</sup>	33.32 <sup>98</sup>	16.299 <sup>334</sup>	54.41 <sup>175</sup>
19.7	34.168 <sup>335</sup>	16.17 <sup>205</sup>	39.549 <sup>331</sup>	51.69 <sup>191</sup>	10.97 <sup>53</sup>	34.82 <sup>150</sup>	16.634 <sup>335</sup>	56.44 <sup>203</sup>
29.7	34.495 <sup>327</sup>	18.42 <sup>225</sup>	39.875 <sup>326</sup>	49.98 <sup>171</sup>	11.50 <sup>53</sup>	36.80 <sup>198</sup>	16.962 <sup>328</sup>	58.68 <sup>224</sup>
July 9.7	34.804 <sup>309</sup>	20.84 <sup>242</sup>	40.187 <sup>312</sup>	48.51 <sup>147</sup>	12.00 <sup>50</sup>	39.22 <sup>242</sup>	17.273 <sup>311</sup>	61.06 <sup>238</sup>
	287	251	292	119	45	278	289	248
19.6	35.091	23.35	40.479	47.32	12.45	42.00	17.562	63.54
29.6	35.345 <sup>254</sup>	25.89 <sup>254</sup>	40.742 <sup>263</sup>	46.42 <sup>90</sup>	12.85 <sup>40</sup>	45.10 <sup>310</sup>	17.820 <sup>258</sup>	66.07 <sup>253</sup>
Aug. 8.6	35.563 <sup>218</sup>	28.42 <sup>253</sup>	40.971 <sup>229</sup>	45.85 <sup>57</sup>	13.19 <sup>34</sup>	48.43 <sup>333</sup>	18.043 <sup>223</sup>	68.58 <sup>251</sup>
18.6	35.742 <sup>179</sup>	30.88 <sup>246</sup>	41.160 <sup>189</sup>	45.60 <sup>25</sup>	13.46 <sup>27</sup>	51.94 <sup>351</sup>	18.227 <sup>184</sup>	71.01 <sup>243</sup>
28.5	35.878 <sup>136</sup>	33.22 <sup>234</sup>	41.306 <sup>146</sup>	45.65 <sup>5</sup>	13.65 <sup>19</sup>	55.53 <sup>359</sup>	18.370 <sup>143</sup>	73.33 <sup>232</sup>
	95	217	101	35	13	361	99	215
Sept. 7.5	35.973 <sup>52</sup>	35.39	41.407	46.00	13.78 <sup>5</sup>	59.14	18.469	75.48
17.5	36.025 <sup>13</sup>	37.37 <sup>198</sup>	41.464 <sup>16</sup>	46.59 <sup>59</sup>	13.83 <sup>—</sup>	62.68 <sup>354</sup>	18.527 <sup>58</sup>	77.45 <sup>197</sup>
27.5	36.038 <sup>23</sup>	39.13 <sup>176</sup>	41.480 <sup>16</sup>	47.40 <sup>81</sup>	13.81 <sup>2</sup>	66.11 <sup>343</sup>	18.546 <sup>19</sup>	79.19 <sup>174</sup>
Oct. 7.4	36.015 <sup>23</sup>	40.63 <sup>150</sup>	41.457 <sup>23</sup>	48.36 <sup>96</sup>	13.73 <sup>8</sup>	69.35 <sup>324</sup>	18.528 <sup>18</sup>	80.69 <sup>150</sup>
17.4	35.962 <sup>53</sup>	41.87 <sup>124</sup>	41.401 <sup>56</sup>	49.43 <sup>107</sup>	13.58 <sup>15</sup>	72.31 <sup>296</sup>	18.480 <sup>48</sup>	81.92 <sup>123</sup>
	80	96	84	111	20	262	75	96
27.4	35.882	42.83	41.317	50.54	13.38	74.93	18.405	82.88
Nov. 6.3	35.782 <sup>100</sup>	43.49 <sup>66</sup>	41.213 <sup>104</sup>	51.64 <sup>110</sup>	13.12 <sup>26</sup>	77.17 <sup>224</sup>	18.310 <sup>95</sup>	83.53 <sup>65</sup>
16.3	35.667 <sup>115</sup>	43.85 <sup>36</sup>	41.093 <sup>120</sup>	52.68 <sup>104</sup>	12.83 <sup>29</sup>	78.95 <sup>178</sup>	18.199 <sup>111</sup>	83.90 <sup>37</sup>
26.3	35.542 <sup>125</sup>	43.91 <sup>6</sup>	40.966 <sup>127</sup>	53.62 <sup>94</sup>	12.51 <sup>32</sup>	80.23 <sup>128</sup>	18.077 <sup>122</sup>	83.97 <sup>7</sup>
Dec. 6.3	35.413 <sup>129</sup>	43.66 <sup>25</sup>	40.837 <sup>129</sup>	54.41 <sup>79</sup>	12.17 <sup>34</sup>	80.97 <sup>74</sup>	17.950 <sup>127</sup>	83.74 <sup>23</sup>
	130	53	126	60	36	17	128	51
16.2	35.283	43.13	40.711	55.01	11.81	81.14	17.822	83.23
26.2	35.158 <sup>125</sup>	42.31 <sup>82</sup>	40.593 <sup>118</sup>	55.43 <sup>42</sup>	11.46 <sup>35</sup>	80.74 <sup>40</sup>	17.697 <sup>125</sup>	82.44 <sup>79</sup>
36.2	35.042 <sup>116</sup>	41.23 <sup>108</sup>	40.485 <sup>108</sup>	55.61 <sup>18</sup>	11.11 <sup>35</sup>	79.76 <sup>98</sup>	17.581 <sup>116</sup>	81.42 <sup>102</sup>
Mean Place	31.586	8.86	36.761	74.07	8.592	37.20	14.067	48.93
Sec $\delta$ , Tan $\delta$	1.089	+0.430	1.068	-0.375	2.118	+1.868	1.086	+0.423
$D\phi a$ , $D\phi a$	+0.06	-0.03	+0.06	+0.02	+0.05	-0.12	+0.06	-0.03
$D\phi \delta$ , $D\phi \delta$	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\kappa$ Piscium. Mag. 4.9		$\theta$ Piscium. Mag. 4.4		70 Pegasi. Mag. 4.7		$\beta$ Sculptoris. Mag. 4.5	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 22	° ' " + 0 48	h m 23 23	° ' " + 5 55	h m 23 24	° ' " +12 18	h m 23 28	° ' " -38 16
	s	"	s	"	s	"	s	"
Jan. 1.2	41.222	8.89	45.961	29.30	57.852	17.84	32.131	46.44
11.2	41.135	8.20	45.871	28.49	57.757	16.89	31.993	45.93
21.1	41.062	7.54	45.796	27.66	57.675	15.86	31.876	45.03
31.1	41.005	6.94	45.736	26.85	57.612	14.80	31.783	43.79
Feb. 10.1	40.971	6.45	45.698	26.11	57.569	13.75	31.720	42.22
20.1	40.961	6.09	45.686	25.48	57.553	12.77	31.689	40.36
Mar. 2.0	40.980	5.91	45.703	24.99	57.567	11.92	31.693	38.24
12.0	41.030	5.93	45.752	24.71	57.613	11.26	31.736	35.91
22.0	41.116	6.20	45.837	24.66	57.697	10.82	31.821	33.39
31.9	41.239	6.71	45.959	24.88	57.820	10.66	31.950	30.74
Apr. 10.9	41.399	7.50	46.119	25.37	57.982	10.81	32.123	28.01
20.9	41.596	8.56	46.315	26.17	58.182	11.27	32.339	25.25
30.9	41.826	9.87	46.545	27.26	58.416	12.07	32.596	22.52
May 10.8	42.087	11.42	46.807	28.61	58.682	13.19	32.890	19.88
20.8	42.372	13.16	47.093	30.21	58.973	14.60	33.214	17.38
30.8	42.676	15.05	47.398	32.01	59.283	16.27	33.564	15.07
June 9.8	42.991	17.06	47.713	33.97	59.603	18.16	33.929	13.02
19.7	43.309	19.13	48.031	36.05	59.925	20.23	34.302	11.28
29.7	43.621	21.20	48.344	38.17	60.242	22.40	34.673	9.89
July 9.7	43.919	23.22	48.642	40.30	60.545	24.64	35.031	8.88
19.6	44.198	25.15	48.921	42.37	60.827	26.88	35.369	8.27
29.6	44.449	26.94	49.172	44.34	61.080	29.07	35.675	8.09
Aug. 8.6	44.666	28.53	49.390	46.18	61.300	31.17	35.943	8.32
18.6	44.846	29.93	49.571	47.83	61.483	33.13	36.167	8.94
28.5	44.988	31.09	49.713	49.28	61.626	34.93	36.342	9.91
Sept. 7.5	45.089	32.01	49.814	50.49	61.728	36.51	36.465	11.21
17.5	45.149	32.69	49.875	51.49	61.790	37.88	36.535	12.77
27.5	45.172	33.14	49.898	52.24	61.814	39.01	36.554	14.51
Oct. 7.4	45.160	33.36	49.887	52.77	61.804	39.92	36.525	16.35
17.4	45.119	33.39	49.847	53.07	61.764	40.57	36.454	18.22
27.4	45.052	33.25	49.781	53.18	61.699	41.00	36.346	20.03
Nov. 6.3	44.968	32.94	49.697	53.10	61.615	41.20	36.210	21.70
16.3	44.869	32.51	49.598	52.84	61.515	41.19	36.054	23.17
26.3	44.762	31.97	49.491	52.43	61.406	40.95	35.884	24.35
Dec. 6.3	44.651	31.36	49.379	51.90	61.293	40.53	35.709	25.20
16.2	44.541	30.69	49.267	51.25	61.178	39.93	35.535	25.71
26.2	44.435	29.97	49.160	50.50	61.067	39.16	35.370	25.83
36.2	44.338	29.25	49.061	49.69	60.962	38.26	35.217	25.57
Mean Place	40.659	4.07	45.418	22.75	57.338	9.10	31.456	39.40
Sec $\delta$ , Tan $\delta$	1.000	+0.014	1.005	+0.104	1.024	+0.218	1.274	-0.789
$D\psi\alpha$ , $D\omega\alpha$	+0.06	0.00	+0.06	-0.01	+0.06	-0.01	+0.06	+0.05
$D\psi\delta$ , $D\omega\delta$	+0.4	-0.2	+0.4	-0.2	+0.4	-0.2	+0.4	-0.1

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	72 Pegasi (mean). Mag. 5.2		$\lambda$ Andromedæ. Mag. 4.0		$\gamma$ Andromedæ. Mag. 4.3		$\gamma$ Piscium. Mag. 4.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 29	° ' " +30 52	h m 23 33	° ' " +46 0	h m 23 34	° ' " +42 48	h m 23 35	° ' " + 5 10
Jan. 1.2	50.324 <sup>128</sup>	16.70	30.044 <sup>188</sup>	49.44	3.942 <sup>173</sup>	49.01	41.442 <sup>93</sup>	41.29
11.2	50.196 <sup>113</sup>	15.50	29.856 <sup>170</sup>	48.21	3.769 <sup>156</sup>	47.79	41.349 <sup>82</sup>	40.50
21.1	50.083 <sup>65</sup>	14.06	29.686 <sup>147</sup>	46.59	3.613 <sup>134</sup>	46.20	41.267 <sup>66</sup>	39.70
31.1	49.988 <sup>98</sup>	12.41	29.539 <sup>113</sup>	44.64	3.479 <sup>103</sup>	44.32	41.201 <sup>47</sup>	38.93
Feb. 10.1	49.920 <sup>38</sup>	10.63	29.426 <sup>72</sup>	42.44	3.376 <sup>65</sup>	42.20	41.154 <sup>22</sup>	38.24
20.1	49.882 <sup>3</sup>	8.80	29.354 <sup>26</sup>	40.09	3.311 <sup>22</sup>	39.95	41.132 <sup>5</sup>	37.65
Mar. 2.0	49.879 <sup>39</sup>	7.00	29.328 <sup>26</sup>	37.68	3.289 <sup>27</sup>	37.66	41.137 <sup>38</sup>	37.20
12.0	49.918 <sup>82</sup>	5.33	29.354 <sup>82</sup>	35.31	3.316 <sup>80</sup>	35.43	41.175 <sup>73</sup>	36.96
22.0	50.000 <sup>127</sup>	3.84	29.436 <sup>140</sup>	33.11	3.396 <sup>134</sup>	33.37	41.248 <sup>111</sup>	36.94
Apr. 1.0	50.127 <sup>172</sup>	2.63	29.576 <sup>196</sup>	31.15	3.530 <sup>189</sup>	31.56	41.359 <sup>150</sup>	37.19
10.9	50.299 <sup>216</sup>	1.76	29.772 <sup>251</sup>	29.52	3.719 <sup>240</sup>	30.08	41.509 <sup>187</sup>	37.70
20.9	50.515 <sup>257</sup>	1.26	30.023 <sup>290</sup>	28.30	3.959 <sup>286</sup>	29.00	41.696 <sup>223</sup>	38.51
30.9	50.772 <sup>291</sup>	1.18	30.322 <sup>341</sup>	27.52	4.245 <sup>326</sup>	28.37	41.919 <sup>255</sup>	39.60
May 10.8	51.063 <sup>319</sup>	1.53	30.663 <sup>374</sup>	27.23	4.571 <sup>359</sup>	28.22	42.174 <sup>282</sup>	40.95
20.8	51.382 <sup>339</sup>	2.31	31.037 <sup>398</sup>	27.44	4.930 <sup>381</sup>	28.55	42.456 <sup>302</sup>	42.54
30.8	51.721 <sup>351</sup>	3.50	31.435 <sup>409</sup>	28.16	5.311 <sup>393</sup>	29.36	42.758 <sup>314</sup>	44.33
June 9.8	52.072 <sup>352</sup>	5.06	31.844 <sup>412</sup>	29.35	5.704 <sup>396</sup>	30.64	43.072 <sup>320</sup>	46.27
19.7	52.424 <sup>346</sup>	6.95	32.256 <sup>403</sup>	30.99	6.100 <sup>388</sup>	32.34	43.392 <sup>316</sup>	48.31
29.7	52.770 <sup>330</sup>	9.13	32.659 <sup>384</sup>	33.03	6.488 <sup>369</sup>	34.42	43.708 <sup>303</sup>	50.41
July 9.7	53.100 <sup>306</sup>	11.54	33.043 <sup>355</sup>	35.41	6.857 <sup>342</sup>	36.81	44.011 <sup>286</sup>	52.50
19.7	53.406 <sup>276</sup>	14.13	33.398 <sup>319</sup>	38.09	7.199 <sup>307</sup>	39.48	44.297 <sup>259</sup>	54.54
29.6	53.682 <sup>239</sup>	16.81	33.717 <sup>276</sup>	40.98	7.506 <sup>267</sup>	42.35	44.556 <sup>228</sup>	56.47
Aug. 8.6	53.921 <sup>198</sup>	19.54	33.993 <sup>229</sup>	44.05	7.773 <sup>222</sup>	45.36	44.784 <sup>192</sup>	58.26
18.6	54.119 <sup>155</sup>	22.26	34.222 <sup>177</sup>	47.19	7.995 <sup>173</sup>	48.44	44.976 <sup>153</sup>	59.86
28.5	54.274 <sup>111</sup>	24.92	34.399 <sup>126</sup>	50.36	8.168 <sup>123</sup>	51.53	45.129 <sup>114</sup>	61.26
Sept. 7.5	54.385 <sup>68</sup>	27.45	34.525 <sup>75</sup>	53.50	8.291 <sup>75</sup>	54.55	45.243 <sup>74</sup>	62.43
17.5	54.453 <sup>26</sup>	29.83	34.600 <sup>25</sup>	56.53	8.366 <sup>27</sup>	57.47	45.317 <sup>36</sup>	63.37
27.5	54.479 <sup>12</sup>	31.99	34.625 <sup>22</sup>	59.41	8.393 <sup>17</sup>	60.22	45.353 <sup>2</sup>	64.06
Oct. 7.4	54.467 <sup>45</sup>	33.92	34.603 <sup>63</sup>	62.07	8.376 <sup>56</sup>	62.75	45.355 <sup>29</sup>	64.54
17.4	54.422 <sup>76</sup>	35.59	34.540 <sup>99</sup>	64.47	8.320 <sup>91</sup>	65.02	45.326 <sup>53</sup>	64.79
27.4	54.346 <sup>98</sup>	36.97	34.441 <sup>133</sup>	66.55	8.229 <sup>122</sup>	66.97	45.273 <sup>76</sup>	64.85
Nov. 6.4	54.248 <sup>118</sup>	38.02	34.308 <sup>159</sup>	68.27	8.107 <sup>145</sup>	68.57	45.197 <sup>90</sup>	64.72
16.3	54.130 <sup>132</sup>	38.73	34.149 <sup>179</sup>	69.58	7.962 <sup>165</sup>	69.79	45.107 <sup>100</sup>	64.43
26.3	53.998 <sup>140</sup>	39.09	33.970 <sup>193</sup>	70.46	7.797 <sup>185</sup>	70.58	45.007 <sup>110</sup>	64.00
Dec. 6.3	53.858 <sup>143</sup>	39.10	33.777 <sup>201</sup>	70.89	7.619 <sup>185</sup>	70.93	44.900 <sup>110</sup>	63.45
16.2	53.715 <sup>143</sup>	38.74	33.576 <sup>202</sup>	70.85	7.434 <sup>187</sup>	70.84	44.790 <sup>107</sup>	62.80
26.2	53.572 <sup>138</sup>	38.04	33.374 <sup>199</sup>	70.33	7.247 <sup>182</sup>	70.29	44.683 <sup>102</sup>	62.06
36.2	53.434 <sup>138</sup>	37.01	33.175 <sup>199</sup>	69.34	7.065 <sup>182</sup>	69.32	44.581 <sup>102</sup>	61.27
Mean Place	49.929	1.86	29.829	30.22	3.667	30.57	40.825	34.77
Sec $\delta$ , Tan $\delta$	1.165	+0.598	1.440	+1.036	1.363	+0.926	1.004	+0.091
$D\phi\alpha$ , $D\omega\alpha$	+0.06	-0.04	+0.06	-0.07	+0.06	-0.06	+0.06	-0.07
$D\phi\delta$ , $D\omega\delta$	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1

510 APPARENT PLACES OF STARS, 1917.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\gamma$ Cephei. Mag. 3.4		$\kappa$ Andromedæ. Mag. 4.3		$\omega^2$ Aquarii. Mag. 4.6		$\iota^1$ Aquarii. Mag. 5.3	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 35	° ' " +77 10	h m 23 36	° ' " +43 52	h m 23 38	° ' " -14 59	h m 23 39	° ' " -18 43
	s	"	s	"	s	"	s	"
Jan. 1.2	54.17	33.91	19.213	45.91	25.846	74.02	54.614	77.35
11.2	53.34	33.04	19.035	44.72	25.747	74.29	54.511	77.53
21.2	52.56	31.57	18.873	43.15	25.660	74.38	54.420	77.48
31.1	51.87	29.58	18.733	41.27	25.591	74.27	54.347	77.19
Feb. 10.1	51.31	27.15	18.625	39.14	25.541	73.94	54.294	76.68
20.1	50.90	24.38	18.555	36.87	25.516	73.40	54.267	75.91
Mar. 2.0	50.65	21.38	18.529	34.56	25.519	72.62	54.267	74.92
12.0	50.57	18.29	18.553	32.29	25.554	71.62	54.300	73.69
22.0	50.69	15.24	18.630	30.19	25.624	70.39	54.368	72.24
Apr. 1.0	50.99	12.33	18.763	28.32	25.731	68.94	54.474	70.57
10.9	51.47	9.69	18.952	26.79	25.876	67.28	54.619	68.72
20.9	52.11	7.42	19.192	25.65	26.059	65.45	54.802	66.71
30.9	52.89	5.60	19.480	24.96	26.280	63.47	55.023	64.57
May 10.8	53.78	4.29	19.808	24.74	26.533	61.37	55.277	62.36
20.8	54.76	3.54	20.171	25.01	26.813	59.21	55.559	60.11
30.8	55.80	3.37	20.556	25.77	27.117	57.04	55.864	57.88
June 9.8	56.87	3.78	20.955	26.99	27.434	54.91	56.184	55.74
19.7	57.93	4.77	21.356	28.65	27.758	52.87	56.511	53.71
29.7	58.95	6.30	21.749	30.70	28.081	50.98	56.838	51.86
July 9.7	59.92	8.33	22.125	33.07	28.392	49.28	57.155	50.25
19.7	60.81	10.82	22.473	35.73	28.687	47.81	57.453	48.89
29.6	61.60	13.70	22.786	38.59	28.955	46.62	57.727	47.84
Aug. 8.6	62.27	16.91	23.059	41.62	29.193	45.71	57.969	47.10
18.6	62.81	20.39	23.286	44.71	29.394	45.11	58.174	46.67
28.5	63.22	24.05	23.464	47.82	29.555	44.82	58.339	46.58
Sept. 7.5	63.48	27.83	23.592	50.88	29.673	44.81	58.461	46.79
17.5	63.59	31.65	23.670	53.84	29.750	45.08	58.540	47.27
27.5	63.56	35.43	23.701	56.64	29.787	45.57	58.578	47.99
Oct. 7.4	63.38	39.09	23.686	59.22	29.788	46.28	58.578	48.89
17.4	63.07	42.54	23.631	61.55	29.754	47.12	58.543	49.92
27.4	62.62	45.71	23.540	63.56	29.693	48.05	58.479	51.03
Nov. 6.4	62.06	48.55	23.418	65.21	29.610	49.04	58.393	52.17
16.3	61.40	50.94	23.271	66.48	29.510	50.02	58.289	53.27
26.3	60.65	52.84	23.103	67.32	29.399	50.95	58.172	54.28
Dec. 6.3	59.84	54.18	22.922	67.72	29.281	51.79	58.050	55.17
16.2	58.98	54.92	22.733	67.67	29.163	52.50	57.926	55.89
26.2	58.10	55.04	22.541	67.16	29.048	53.08	57.806	56.43
36.2	57.24	54.53	22.356	66.21	28.940	53.50	57.694	56.75
Mean Place	55.858	8.83	18.934	27.14	25.143	73.76	53.896	75.92
Sec $\delta$ , Tan $\delta$	4.505	+4.393	1.387	+0.962	1.035	-0.268	1.056	-0.339
$D\phi\alpha$ , $D\omega\alpha$	+0.05	-0.29	+0.06	-0.06	+0.06	+0.02	+0.06	+0.02
$D\phi\delta$ , $D\omega\delta$	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\psi$ Andromedæ. Mag. 5.1		41 H. Cephei. Mag. 5.0		$\delta$ Sculptoris. Mag. 4.6		$\phi$ Pegasi. Mag. 5.2	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 41	° ' " +45 57	h m 23 43	° ' " +67 20	h m 23 44	° ' " -28 34	h m 23 48	° ' " +18 39
	s "	"	s "	"	s "	"	s "	"
Jan. 1.2	55.267 191	53.08 113	55.62 44	67.99 95	37.001 121	87.29 8	16.405 110	44.77 96
11.2	55.076 177	51.95 154	55.18 41	67.04 148	36.880 108	87.21 40	16.295 101	43.81 110
21.2	54.899 152	50.41 186	54.77 37	65.56 197	36.772 90	86.81 72	16.194 57	42.71 121
31.1	54.747 121	48.55 213	54.40 30	63.59 237	36.682 66	86.09 100	16.107 66	41.50 125
Feb. 10.1	54.626 83	46.42 230	54.10 22	61.22 260	36.616 41	85.09 129	16.041 43	40.25 124
20.1	54.543 37	44.12 237	53.88 13	58.53 287	36.575 9	83.80 155	15.998 12	39.01 115
Mar. 2.0	54.506 14	41.75 234	53.75 3	55.66 295	36.566 26	82.25 180	15.986 22	37.86 102
12.0	54.520 70	39.41 219	53.72 8	52.71 290	36.592 63	80.45 201	16.008 60	36.84 81
22.0	54.590 128	37.22 198	53.80 18	49.81 274	36.655 103	78.44 220	16.068 101	36.03 57
Apr. 1.0	54.718 186	35.24 165	53.98 28	47.07 245	36.758 144	76.24 234	16.169 144	35.46 26
10.9	54.904 241	33.59 126	54.26 39	44.62 206	36.902 184	73.90 245	16.313 184	35.20 7
20.9	55.145 291	32.33 82	54.65 46	42.54 163	37.086 225	71.45 251	16.497 223	35.27 41
30.9	55.436 333	31.51 35	55.11 54	40.91 113	37.311 261	68.94 251	16.720 259	35.68 77
May 10.9	55.769 370	31.16 15	55.65 60	39.78 58	37.572 293	66.43 247	16.979 287	36.45 110
20.8	56.139 394	31.31 64	56.25 63	39.20 1	37.865 317	63.96 236	17.266 311	37.55 141
30.8	56.533 410	31.95 112	56.88 66	39.19 55	38.182 333	61.60 219	17.577 324	38.96 170
June 9.8	56.943 413	33.07 156	57.54 66	39.74 110	38.515 344	59.41 198	17.901 330	40.66 192
19.7	57.356 406	34.63 197	58.20 65	40.84 161	38.859 344	57.43 170	18.231 328	42.58 211
29.7	57.762 388	36.60 233	58.85 61	42.45 209	39.203 335	55.73 140	18.559 318	44.69 223
July 9.7	58.150 361	38.93 262	59.46 57	44.54 252	39.538 318	54.33 104	18.877 298	46.92 231
19.7	58.511 328	41.55 284	60.03 52	47.06 288	39.856 292	53.29 68	19.175 274	49.23 233
29.6	58.839 286	44.39 303	60.55 45	49.94 319	40.148 259	52.61 31	19.449 241	51.56 228
Aug. 8.6	59.125 239	47.42 312	61.00 35	53.13 340	40.407 220	52.30 7	19.690 206	53.84 221
18.6	59.364 190	50.54 315	61.35 29	56.53 358	40.627 178	52.37 42	19.896 167	56.05 207
28.6	59.554 138	53.69 313	61.64 20	60.11 365	40.805 132	52.79 76	20.063 127	58.12 192
Sept. 7.5	59.692 87	56.82 303	61.84 12	63.76 367	40.937 85	53.55 104	20.190 87	60.04 172
17.5	59.779 37	59.85 290	61.96 3	67.43 360	41.022 41	54.59 128	20.277 50	61.76 151
27.5	59.816 9	62.75 269	61.99 5	71.03 345	41.063 0	55.87 143	20.327 13	63.27 127
Oct. 7.4	59.807 50	65.44 243	61.94 13	74.48 326	41.063 40	57.30 153	20.340 18	64.54 104
17.4	59.757 90	67.87 213	61.81 22	77.74 296	41.023 73	58.83 156	20.322 46	65.58 79
27.4	59.667 122	70.00 178	61.59 27	80.70 261	40.950 98	60.39 150	20.276 70	66.37 54
Nov. 6.4	59.545 149	71.78 140	61.32 32	83.31 218	40.852 119	61.89 139	20.206 87	66.91 28
16.3	59.396 173	73.18 97	61.00 38	85.49 170	40.733 133	63.28 122	20.119 102	67.19 4
26.3	59.223 187	74.15 51	60.62 42	87.19 117	40.600 140	64.50 99	20.017 112	67.23 22
Dec. 6.3	59.036 198	74.66 4	60.20 44	88.36 60	40.460 143	65.49 71	19.905 118	67.01 44
16.3	58.838 203	74.70 42	59.76 46	88.96 1	40.317 140	66.20 44	19.787 119	66.57 68
26.2	58.635 199	74.28 89	59.30 45	88.95 59	40.177 132	66.64 13	19.668 117	65.89 86
36.2	58.436	73.39	58.85	88.36	40.045	66.77	19.551	65.03
Mean Place	54.967	33.59	55.971	43.89	36.240	82.88	15.780	33.40
Sec $\delta$ , Tan $\delta$	1.439	+1.034	2.597	+2.396	1.139	-0.545	1.056	+0.338
$D\phi\alpha$ , $D\alpha\alpha$	+0.06	-0.07	+0.06	-0.16	+0.06	+0.04	+0.06	-0.08
$D\delta\delta$ , $D\alpha\delta$	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1	+0.4	-0.1



## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\rho$ Cassiopeie. Mag. 4.8		Groombridge 4163. Mag. 6.6		$\omega$ Piscium. Mag. 4.0	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 50 s	° ' " +57 2 "	h m 23 50 s	° ' " +73 56 "	h m 23 55 s	° ' " + 6 24 "
Jan. 1.2	13.877	37.82	45.73	79.44	3.625	21.17
11.2	13.597 280	36.85 97	45.07 66	78.70 74	3.524 101	20.41 76
21.2	13.336 261	35.39 146	44.45 62	77.38 132	3.431 93	19.62 79
31.1	13.103 233	33.50 189	43.89 56	75.53 185	3.351 80	18.85 77
Feb. 10.1	12.912 191	31.26 224	43.43 46	73.22 231	3.289 62	18.14 71
	141	250	36	266	42	63
20.1	12.771 81	28.76	43.07 24	70.56 290	3.247 13	17.51 48
Mar. 2.0	12.690 15	26.11 265	42.83 9	67.66 303	3.234 18	17.03 30
12.0	12.675 60	23.42 269	42.74 6	64.63 302	3.252 53	16.73 10
22.0	12.735 135	20.81 243	42.80 21	61.61 290	3.305 91	16.63 17
Apr. 1.0	12.870 208	18.38 214	43.01 35	58.71 265	3.396 131	16.80 43
10.9	13.078 279	16.24 177	43.36 49	56.06 232	3.527 171	17.23 72
20.9	13.357 342	14.47 133	43.85 60	53.74 189	3.698 209	17.95 100
30.9	13.699 398	13.14 84	44.45 71	51.85 138	3.907 242	18.95 128
May 10.9	14.097 443	12.30 33	45.16 78	50.47 86	4.149 272	20.23 151
20.8	14.540 475	11.97 21	45.94 84	49.61 29	4.421 295	21.74 173
30.8	15.015 495	12.18 74	46.78 88	49.32 29	4.716 312	23.47 189
June 9.8	15.510 500	12.92 126	47.66 88	49.61 85	5.028 319	25.36 202
19.7	16.010 492	14.18 172	48.54 86	50.46 141	5.347 319	27.38 208
29.7	16.502 471	15.90 216	49.40 83	51.87 190	5.666 309	29.46 210
July 9.7	16.973 441	18.06 253	50.23 77	53.77 235	5.975 294	31.56 206
19.7	17.414 401	20.59 283	51.00 69	56.12 276	6.269 270	33.62 197
29.6	17.815 351	23.42 310	51.69 61	58.88 311	6.539 242	35.59 183
Aug. 8.6	18.166 296	26.52 327	52.30 50	61.99 337	6.781 207	37.42 166
18.6	18.462 235	29.79 339	52.80 39	65.36 359	6.988 171	39.08 148
28.6	18.697 174	33.18 343	53.19 28	68.95 370	7.159 132	40.56 124
Sept. 7.5	18.871 112	36.61 341	53.47 17	72.65 376	7.291 94	41.80 102
17.5	18.983 50	40.02 331	53.64 4	76.41 373	7.385 56	42.82 77
27.5	19.033 10	43.33 314	53.68 7	80.14 364	7.441 20	43.59 55
Oct. 7.4	19.023 65	46.47 293	53.61 18	83.78 345	7.461 9	44.14 34
17.4	18.958 116	49.40 264	53.43 29	87.23 319	7.452 38	44.48 12
27.4	18.842 161	52.04 229	53.14 38	90.42 286	7.414 60	44.60 6
Nov. 6.4	18.681 201	54.33 189	52.76 48	93.28 245	7.354 78	44.54 23
16.3	18.480 233	56.22 143	52.28 55	95.73 197	7.276 92	44.31 38
26.3	18.247 261	57.65 92	51.73 60	97.70 143	7.184 101	43.93 50
Dec. 6.3	17.986 278	58.57 41	51.13 65	99.13 85	7.083 107	43.43 61
16.3	17.708 287	58.98 14	50.48 68	99.98 25	6.976 109	42.82 71
26.2	17.421 288	58.84 67	49.80 67	100.23 38	6.867 107	42.11 76
36.2	17.133	58.17	49.13	99.85	6.760	41.35
Mean Place	13.711	15.48	46.464	54.22	2.897	13.92
Sec $\delta$ , Tan $\delta$	1.838	+1.542	3.618	+3.477	1.006	+0.112
$D\psi \alpha$ , $D\omega \alpha$	+0.06	-0.10	+0.06	-0.23	+0.06	-0.01
$D\psi \delta$ , $D\omega \delta$	+0.4	0.0	+0.4	0.0	+0.4	0.0

## FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	$\epsilon$ Tucanæ. Mag. 4.7		30 Piscium. Mag. 4.7		2 Ceti. Mag. 4.6	
	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.	Right Ascension.	Declina- tion.
	h m 23 55	° ' " -66 1	h m 23 57	° ' " - 6 28	h m 23 59	° ' " -17 47
	s	"	s	"	s	"
Jan. 1.2	37.54	91.37	42.998	28.42	30.163	54.22
11.2	37.14 40	90.24 113	42.897 101	28.95 53	30.053 110	54.49 27
21.2	36.77 37	88.56 168	42.805 92	29.36 41	29.951 102	54.54 5
31.1	36.45 32	86.40 216	42.725 80	29.63 27	29.864 87	54.35 19
Feb. 10.1	36.19 26	83.81 259	42.663 62	29.75 12	29.795 69	53.93 42
	19	296	42	5	49	68
20.1	36.00	80.85	42.621	29.70	29.746	53.25
Mar. 2.1	35.88 12	77.61 324	42.606 15	29.43 27	29.729 17	52.34 91
12.0	35.82 6	74.14 347	42.621 15	28.95 48	29.740 11	51.18 116
22.0	35.86 4	70.56 358	42.670 49	28.23 72	29.786 46	49.79 139
Apr. 1.0	35.98 12	66.91 365	42.757 87	27.29 94	29.871 85	48.17 162
	19	364	126	119	123	181
10.9	36.17	63.27	42.883	26.10	29.994	46.36
20.9	36.45 28	59.74 353	43.048 165	24.70 140	30.158 164	44.37 199
30.9	36.81 36	56.36 338	43.250 202	23.07 163	30.361 203	42.24 213
May 10.9	37.23 42	53.24 312	43.486 236	21.27 180	30.598 237	40.02 222
20.8	37.72 49	50.41 283	43.753 287	19.33 194	30.868 270	37.75 227
	54	245	290	204	295	228
30.8	38.26	47.96	44.043	17.29	31.163	35.47
June 9.8	38.84 58	45.94 202	44.351 308	15.20 209	31.476 313	33.25 222
19.8	39.44 60	44.39 155	44.667 316	13.11 209	31.800 324	31.16 209
29.7	40.05 61	43.36 103	44.985 318	11.08 203	32.126 326	29.21 195
July 9.7	40.66 61	42.88 48	45.295 310	9.16 192	32.446 320	27.49 172
	58	5	295	176	303	146
19.7	41.24	42.93	45.590	7.40	32.749	26.03
29.6	41.78 54	43.52 59	45.864 274	5.84 156	33.033 284	24.86 117
Aug. 8.6	42.26 48	44.63 111	46.109 245	4.51 133	33.287 254	24.02 84
18.6	42.67 41	46.23 160	46.320 211	3.45 106	33.506 219	23.49 53
28.6	42.99 32	48.25 202	46.494 174	2.66 79	33.687 181	23.30 19
	24	236	136	53	142	12
Sept. 7.5	43.23	50.61	46.630	2.13	33.829	23.42
17.5	43.37 14	53.25 264	46.726 96	1.88 25	33.927 98	23.83 41
27.5	43.42 5	56.05 280	46.783 57	1.88 0	33.985 58	24.51 68
Oct. 7.5	43.36 6	58.90 285	46.804 21	2.11 23	34.004 19	25.40 89
17.4	43.20 16	61.69 279	46.792 12	2.52 41	33.989 15	26.43 103
	23	260	38	56	45	114
27.4	42.97	64.29	46.754	3.08	33.944	27.57
Nov. 6.4	42.67 30	66.63 234	46.691 63	3.76 68	33.873 71	28.74 117
16.3	42.30 37	68.57 194	46.610 81	4.51 75	33.782 91	29.90 116
26.3	41.89 41	70.06 149	46.516 94	5.29 78	33.677 105	30.98 108
Dec. 6.3	41.46 43	71.02 96	46.413 103	6.07 78	33.561 116	31.96 98
	45	39	109	75	120	83
16.3	41.01	71.41	46.304	6.82	33.441	32.79
26.2	40.57 44	71.22 19	46.194 110	7.50 68	33.320 121	33.42 63
36.2	40.14 43	70.45 77	46.085 109	8.11 61	33.203 117	33.85 43
Mean Place	36.742	79.02	42.213	31.21	29.339	53.22
Sec $\delta$ , Tan $\delta$	2.462	-2.250	1.006	-0.113	1.050	-0.321
$D\psi a$ , $D_{\omega} a$	+0.06	+0.15	+0.06	+0.01	+0.06	+0.02
$D\psi \delta$ , $D_{\omega} \delta$	+0.4	0.0	+0.4	0.0	+0.4	0.0

## FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Semi-Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
Jan. 1	18 46 47.50	11.041	-23 0 53.2	+12.34	+ 3 40.62	+1.182	16 17.87	1 11.05	18 43 6.28
2	18 51 12.32	11.027	22 55 43.3	13.48	4 8.82	1.167	16 17.88	1 11.00	18 47 2.84
3	18 55 36.77	11.010	22 50 6.1	14.61	4 36.63	1.150	16 17.88	1 10.95	18 50 59.39
4	19 0 0.82	10.983	22 44 1.6	15.75	5 4.05	1.133	16 17.88	1 10.90	18 54 55.95
5	19 4 24.45	10.975	22 37 30.1	16.87	5 31.04	1.115	16 17.87	1 10.84	18 58 52.51
6	19 8 47.62	10.956	-22 30 31.9	+17.98	+ 5 57.58	+1.096	16 17.85	1 10.78	19 2 49.07
7	19 13 10.33	10.936	22 23 7.0	19.09	6 23.66	1.076	16 17.82	1 10.72	19 6 45.63
8	19 17 32.53	10.914	22 15 15.7	20.18	6 49.23	1.054	16 17.79	1 10.65	19 10 42.18
9	19 21 54.20	10.892	22 6 58.1	21.27	7 14.29	1.032	16 17.76	1 10.57	19 14 38.74
10	19 26 15.34	10.869	21 58 14.7	22.35	7 38.80	1.010	16 17.72	1 10.49	19 18 35.30
11	19 30 35.92	10.845	-21 49 5.4	+23.42	+ 8 2.75	+0.986	16 17.67	1 10.41	19 22 31.86
12	19 34 55.90	10.820	21 39 30.6	24.47	8 26.12	0.962	16 17.62	1 10.33	19 26 28.42
13	19 39 15.29	10.794	21 29 30.7	25.52	8 48.89	0.935	16 17.56	1 10.25	19 30 24.97
14	19 43 34.06	10.768	21 19 5.9	26.55	9 11.04	0.909	16 17.50	1 10.16	19 34 21.53
15	19 47 52.19	10.741	21 8 16.3	27.57	9 32.55	0.882	16 17.42	1 10.07	19 38 18.09
16	19 52 9.66	10.714	-20 57 2.4	+28.58	+ 9 53.40	+0.856	16 17.34	1 9.97	19 42 14.65
17	19 56 26.45	10.685	20 45 24.4	29.58	10 13.58	0.827	16 17.26	1 9.88	19 46 11.21
18	20 0 42.55	10.656	20 33 22.7	30.56	10 33.08	0.798	16 17.18	1 9.78	19 50 7.76
19	20 4 57.95	10.626	20 20 57.6	31.53	10 51.85	0.768	16 17.09	1 9.68	19 54 4.32
20	20 9 12.62	10.595	20 8 9.3	32.48	11 9.92	0.737	16 17.00	1 9.58	19 58 0.88
21	20 13 26.55	10.564	-19 54 58.4	+33.42	+11 27.25	+0.706	16 16.90	1 9.47	20 1 57.43
22	20 17 39.72	10.533	19 41 25.3	34.33	11 43.81	0.674	16 16.80	1 9.37	20 5 53.99
23	20 21 52.11	10.500	19 27 30.1	35.24	11 59.60	0.642	16 16.70	1 9.26	20 9 50.55
24	20 26 3.72	10.467	19 13 13.4	36.14	12 14.61	0.609	16 16.59	1 9.15	20 13 47.11
25	20 30 14.52	10.433	18 58 35.6	37.00	12 28.82	0.575	16 16.48	1 9.04	20 17 43.66
26	20 34 24.50	10.399	-18 43 36.9	+37.96	+12 42.21	+0.541	16 16.37	1 8.93	20 21 40.22
27	20 38 33.67	10.365	18 28 18.0	38.70	12 54.79	0.507	16 16.25	1 8.81	20 25 36.78
28	20 42 42.00	10.330	18 12 39.2	39.52	13 6.52	0.472	16 16.13	1 8.70	20 29 33.33
29	20 46 49.50	10.295	17 56 40.8	40.33	13 17.43	0.438	16 16.00	1 8.59	20 33 29.89
30	20 50 56.15	10.260	17 40 23.2	41.12	13 27.50	0.403	16 15.88	1 8.47	20 37 26.44
31	20 55 1.96	10.225	-17 23 46.9	+41.99	+13 36.73	+0.368	16 15.74	1 8.36	20 41 23.00
Feb. 1	20 59 6.93	10.190	17 6 52.3	42.65	13 45.12	0.333	16 15.61	1 8.24	20 45 19.56
2	21 3 11.07	10.155	16 49 39.7	43.39	13 52.68	0.298	16 15.46	1 8.13	20 49 16.11
3	21 7 14.36	10.121	16 32 9.5	44.11	13 59.40	0.263	16 15.32	1 8.01	20 53 12.67
4	21 11 16.83	10.086	16 14 22.2	44.82	14 5.29	0.229	16 15.16	1 7.90	20 57 9.22
5	21 15 18.48	10.052	-15 56 18.2	+45.51	+14 10.37	+0.195	16 15.00	1 7.79	21 1 5.78
6	21 19 19.30	10.018	15 37 57.8	46.18	14 14.63	0.161	16 14.83	1 7.67	21 5 2.34
7	21 23 19.32	9.984	15 19 21.4	46.84	14 18.08	0.127	16 14.66	1 7.56	21 8 58.89
8	21 27 18.54	9.951	15 0 29.4	47.48	14 20.74	0.094	16 14.49	1 7.45	21 12 55.45
9	21 31 16.97	9.918	14 41 22.1	48.11	14 22.60	0.061	16 14.31	1 7.34	21 16 52.00
10	21 35 14.61	9.886	-14 22 0.3	+48.72	+14 23.69	+0.029	16 14.12	1 7.23	21 20 48.56
11	21 39 11.49	9.854	14 2 23.9	49.30	14 24.01	-0.003	16 13.94	1 7.12	21 24 45.11
12	21 43 7.60	9.823	13 42 33.6	49.88	14 23.58	0.034	16 13.75	1 7.01	21 28 41.67
13	21 47 2.98	9.792	13 22 29.6	50.44	14 22.40	0.064	16 13.55	1 6.90	21 32 38.22
14	21 50 57.62	9.762	13 2 12.4	50.98	14 20.48	0.094	16 13.35	1 6.79	21 36 34.78
15	21 54 51.54	9.732	-12 41 42.6	+51.50	+14 17.85	-0.124	16 13.14	1 6.68	21 40 31.33
16	21 58 44.74	9.703	-12 21 0.4	+52.01	+14 14.51	-0.153	16 12.93	1 6.58	21 44 27.89

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.19 from the sidereal interval.

## FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Skleral Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
eb. 16	21 58 44.74	9.703	-12 21 0.4	+52.01	+14 14.51	-0.153	16 12.93	1 6.58	21 44 27.89
17	22 2 37.25	9.674	12 0 6.1	52.50	14 10.48	0.182	16 12.72	1 6.48	21 48 24.45
18	22 6 29.07	9.645	11 39 0.4	52.97	14 5.76	0.211	16 12.51	1 6.38	21 52 21.00
19	22 10 20.21	9.617	11 17 43.7	53.41	14 0.37	0.239	16 12.29	1 6.28	21 56 17.55
20	22 14 10.69	9.589	10 56 16.3	53.85	13 54.31	0.266	16 12.07	1 6.18	22 0 14.11
21	22 18 0.51	9.562	-10 34 38.6	+54.27	+13 47.59	-0.293	16 11.85	1 6.09	22 4 10.66
22	22 21 49.70	9.536	10 12 51.2	54.67	13 40.24	0.320	16 11.63	1 5.99	22 8 7.21
23	22 25 38.24	9.509	9 50 54.5	55.08	13 32.25	0.346	16 11.41	1 5.90	22 12 3.77
24	22 29 26.16	9.484	9 28 48.9	55.40	13 23.63	0.371	16 11.19	1 5.81	22 16 0.32
25	22 33 13.47	9.459	9 6 34.9	55.75	13 14.41	0.396	16 10.96	1 5.73	22 19 56.88
26	22 37 0.17	9.434	-8 44 13.0	+56.06	+13 4.60	-0.421	16 10.73	1 5.64	22 23 53.43
27	22 40 46.30	9.410	8 21 43.4	56.38	12 54.20	0.445	16 10.50	1 5.56	22 27 49.98
28	22 44 31.86	9.387	7 59 6.6	56.67	12 43.24	0.468	16 10.27	1 5.49	22 31 46.54
lar. 1	22 48 16.89	9.365	7 36 23.0	56.95	12 31.73	0.490	16 10.04	1 5.41	22 35 43.09
2	22 52 1.38	9.344	7 13 32.9	57.21	12 19.70	0.511	16 9.80	1 5.34	22 39 39.65
3	22 55 45.36	9.323	-6 50 36.7	+57.46	+12 7.17	-0.532	16 9.56	1 5.27	22 43 36.20
4	22 59 28.86	9.303	6 27 35.0	57.68	11 54.14	0.552	16 9.32	1 5.21	22 47 32.75
5	23 3 11.87	9.283	6 4 28.0	57.89	11 40.66	0.571	16 9.08	1 5.14	22 51 29.31
6	23 6 54.46	9.265	5 41 16.0	58.09	11 26.72	0.590	16 8.83	1 5.08	22 55 25.86
7	23 10 36.62	9.248	5 17 59.4	58.28	11 12.36	0.606	16 8.58	1 5.02	22 59 22.41
8	23 14 18.38	9.232	-4 54 38.6	+58.44	+10 57.61	-0.622	16 8.32	1 4.96	23 3 18.97
9	23 17 59.76	9.217	4 31 14.0	58.59	10 42.48	0.638	16 8.06	1 4.91	23 7 15.52
10	23 21 40.79	9.202	4 7 46.0	58.74	10 27.00	0.652	16 7.80	1 4.85	23 11 12.07
11	23 25 21.48	9.189	3 44 14.8	58.85	10 11.18	0.666	16 7.53	1 4.81	23 15 8.63
12	23 29 1.85	9.177	3 20 40.8	58.96	9 55.06	0.678	16 7.27	1 4.76	23 19 5.18
13	23 32 41.96	9.166	-2 57 4.5	+59.06	+9 38.64	-0.689	16 7.00	1 4.72	23 23 1.73
14	23 36 21.79	9.155	2 33 26.1	59.13	9 21.97	0.700	16 6.73	1 4.68	23 26 58.28
15	23 40 1.38	9.145	2 9 45.9	59.20	9 5.05	0.709	16 6.46	1 4.64	23 30 54.84
16	23 43 40.75	9.136	1 46 4.5	59.25	8 47.91	0.718	16 6.18	1 4.60	23 34 51.39
17	23 47 19.93	9.129	1 22 22.2	59.27	8 30.59	0.725	16 5.91	1 4.57	23 38 47.94
18	23 50 58.94	9.122	-0 58 39.2	+59.29	+8 13.09	-0.732	16 5.63	1 4.55	23 42 44.50
19	23 54 37.77	9.116	0 34 56.0	59.30	7 55.43	0.738	16 5.36	1 4.53	23 46 41.05
20	23 58 16.48	9.110	-0 11 13.0	59.27	7 37.63	0.744	16 5.08	1 4.51	23 50 37.60
21	0 1 55.07	9.105	+0 12 29.3	59.24	7 19.72	0.749	16 4.80	1 4.49	23 54 34.16
22	0 5 33.55	9.101	0 36 10.7	59.20	7 1.68	0.753	16 4.53	1 4.47	23 58 30.71
23	0 9 11.94	9.098	+0 59 50.7	+59.13	+6 43.56	-0.756	16 4.25	1 4.46	0 2 27.26
24	0 12 50.25	9.096	1 23 29.0	59.05	6 25.38	0.759	16 3.98	1 4.45	0 6 23.81
25	0 16 28.51	9.094	1 47 5.1	58.95	6 7.14	0.761	16 3.71	1 4.44	0 10 20.37
26	0 20 6.72	9.092	2 10 38.8	58.84	5 48.84	0.762	16 3.43	1 4.44	0 14 16.92
27	0 23 44.91	9.091	2 34 9.5	58.71	5 30.53	0.763	16 3.16	1 4.44	0 18 13.47
28	0 27 23.10	9.091	+2 57 37.0	+58.57	+5 12.22	-0.763	16 2.89	1 4.44	0 22 10.03
29	0 31 1.29	9.092	3 21 0.9	58.41	4 53.91	0.762	16 2.62	1 4.44	0 26 6.58
30	0 34 39.52	9.094	3 44 20.7	58.24	4 35.63	0.760	16 2.35	1 4.45	0 30 3.13
31	0 38 17.80	9.097	4 7 36.4	58.06	4 17.41	0.757	16 2.08	1 4.46	0 33 59.69
pr. 1	0 41 56.15	9.100	4 30 47.4	57.86	3 59.26	0.754	16 1.81	1 4.48	0 37 56.24
2	0 45 34.60	9.104	+4 53 53.4	+57.64	+3 41.20	-0.750	16 1.54	1 4.49	0 41 52.79
3	0 49 13.16	9.109	+5 16 54.1	+57.41	+3 23.25	-0.745	16 1.26	1 4.52	0 45 49.34

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

## FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
Apr. 1	0 41 56.15	9.100	+ 4 30 47.4	+87.86	+3 59.26	-0.754	16 1.81	1 4.48	0 37 56.24
2	0 45 34.60	9.104	4 53 53.4	57.64	3 41.20	0.780	16 1.54	1 4.49	0 41 52.79
3	0 49 13.16	9.109	5 16 54.1	57.41	3 23.25	0.745	16 1.26	1 4.52	0 45 49.34
4	0 52 51.85	9.115	5 39 49.3	57.17	3 5.44	0.730	16 0.99	1 4.54	0 49 45.90
5	0 56 30.68	9.122	6 2 38.4	56.91	2 47.77	0.732	16 0.72	1 4.57	0 53 42.45
6	1 0 9.70	9.130	+ 6 25 21.3	+56.65	+2 30.29	-0.724	16 0.44	1 4.60	0 57 39.00
7	1 3 48.91	9.139	6 47 57.6	56.37	2 12.99	0.716	16 0.17	1 4.63	1 1 35.56
8	1 7 28.35	9.148	7 10 27.0	56.07	1 55.92	0.707	15 59.90	1 4.66	1 5 32.11
9	1 11 8.03	9.158	7 32 49.2	55.76	1 39.09	0.696	15 59.62	1 4.70	1 9 28.66
10	1 14 47.95	9.170	7 55 3.7	55.44	1 22.51	0.684	15 59.34	1 4.74	1 13 25.22
11	1 18 28.16	9.182	+ 8 17 10.5	+55.11	+1 6.22	-0.673	15 59.07	1 4.78	1 17 21.77
12	1 22 8.69	9.195	8 39 9.0	54.78	0 50.22	0.659	15 58.79	1 4.82	1 21 18.33
13	1 25 49.52	9.208	9 0 59.1	54.40	0 34.55	0.646	15 58.51	1 4.87	1 25 14.88
14	1 29 30.70	9.226	9 22 40.2	54.02	0 19.22	0.632	15 58.24	1 4.91	1 29 11.48
15	1 33 12.24	9.238	9 44 12.2	53.68	+0 4.23	0.617	15 57.96	1 4.96	1 33 7.99
16	1 36 54.14	9.254	+10 5 34.6	+53.28	-0 10.37	-0.601	15 57.69	1 5.01	1 37 4.54
17	1 40 36.43	9.271	10 26 47.1	52.91	0 24.60	0.584	15 57.42	1 5.07	1 41 1.10
18	1 44 19.13	9.288	10 47 49.4	52.37	0 38.42	0.567	15 57.15	1 5.13	1 44 57.65
19	1 48 2.23	9.305	11 8 41.0	51.98	0 51.84	0.550	15 56.89	1 5.18	1 48 54.20
20	1 51 45.74	9.322	11 29 21.6	51.45	1 4.83	0.532	15 56.63	1 5.24	1 52 50.76
21	1 55 29.69	9.340	+11 49 51.0	+50.98	-1 17.41	-0.515	15 56.37	1 5.31	1 56 47.31
22	1 59 14.07	9.359	12 10 8.7	50.48	1 29.54	0.496	15 56.11	1 5.37	2 0 43.87
23	2 2 58.91	9.378	12 30 14.3	49.98	1 41.24	0.478	15 55.86	1 5.44	2 4 40.42
24	2 6 44.20	9.397	12 50 7.6	49.45	1 52.47	0.459	15 55.61	1 5.51	2 8 36.96
25	2 10 29.95	9.416	13 9 48.1	48.91	2 3.25	0.440	15 55.36	1 5.58	2 12 33.53
26	2 14 16.16	9.435	+13 29 15.6	+48.37	-2 13.56	-0.420	15 55.12	1 5.65	2 16 30.09
27	2 18 2.86	9.455	13 48 29.7	47.80	2 23.39	0.400	15 54.88	1 5.72	2 20 26.64
28	2 21 50.04	9.476	14 7 30.2	47.22	2 32.73	0.379	15 54.64	1 5.80	2 24 23.19
29	2 25 37.73	9.497	14 26 16.5	46.63	2 41.58	0.359	15 54.40	1 5.88	2 28 19.75
30	2 29 25.92	9.518	14 44 48.6	46.03	2 49.93	0.337	15 54.16	1 5.95	2 32 16.30
May 1	2 33 14.62	9.540	+15 3 6.1	+45.42	-2 57.75	-0.315	15 53.93	1 6.03	2 36 12.86
2	2 37 3.84	9.563	15 21 8.6	44.79	3 5.06	0.293	15 53.70	1 6.11	2 40 9.41
3	2 40 53.60	9.585	15 38 56.0	44.15	3 11.84	0.271	15 53.46	1 6.19	2 44 5.97
4	2 44 43.89	9.607	15 56 27.8	43.50	3 18.09	0.249	15 53.24	1 6.27	2 48 2.53
5	2 48 34.73	9.630	16 13 43.7	42.83	3 23.79	0.226	15 53.01	1 6.35	2 51 59.08
6	2 52 26.13	9.653	+16 30 43.6	+42.15	-3 28.93	-0.208	15 52.78	1 6.43	2 55 55.64
7	2 56 18.10	9.677	16 47 27.0	41.46	3 33.51	0.179	15 52.56	1 6.51	2 59 52.19
8	3 0 10.63	9.701	17 3 53.8	40.76	3 37.53	0.155	15 52.34	1 6.59	3 3 48.75
9	3 4 3.73	9.726	17 20 3.5	40.05	3 40.96	0.131	15 52.11	1 6.68	3 7 45.30
10	3 7 57.43	9.749	17 35 56.0	39.32	3 43.82	0.107	15 51.90	1 6.76	3 11 41.86
11	3 11 51.72	9.774	+17 51 30.9	+38.58	-3 46.08	-0.082	15 51.68	1 6.84	3 15 38.41
12	3 15 46.59	9.799	18 6 48.0	37.83	3 47.75	0.057	15 51.47	1 6.92	3 19 34.97
13	3 19 42.07	9.824	18 21 46.9	37.07	3 48.83	0.033	15 51.26	1 7.00	3 23 31.53
14	3 23 38.14	9.848	18 36 27.3	36.29	3 49.31	-0.008	15 51.05	1 7.08	3 27 28.08
15	3 27 34.80	9.873	18 50 49.1	35.51	3 49.20	+0.017	15 50.84	1 7.16	3 31 24.64
16	3 31 32.07	9.898	+19 4 51.7	+34.71	-3 48.50	+0.041	15 50.64	1 7.24	3 35 21.29
17	3 35 29.92	9.922	+19 18 35.1	+33.89	-3 47.22	+0.065	15 50.44	1 7.32	3 39 17.75

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

## FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.		Var. per Hour.	Semi- diameter.		S. T. of Sem. Pass. Merid.		Sidereal Time of Mean Noon.		
	h	m	s		°	'	"		m	s		'	"	m	s	h	m	s
7	17	3 35	29.92	9.922	+19 18	35.1	+33.89	-3 47.22	+0.065	15 50.44	1 7.32	3 39	17.75					
	18	3 30	28.34	9.946	19 31	58.8	33.07	3 45.35	0.089	15 50.24	1 7.40	3 43	14.31					
	19	3 43	27.33	9.970	19 45	2.7	32.24	3 42.92	0.113	15 50.05	1 7.48	3 47	10.86					
	20	3 47	26.87	9.992	19 57	46.4	31.40	3 39.95	0.136	15 49.86	1 7.56	3 51	7.42					
	21	3 51	26.97	10.015	20 10	9.7	30.54	3 36.41	0.159	15 49.68	1 7.63	3 55	3.98					
	22	3 55	27.61	10.037	+20 22	12.3	+29.67	-3 32.35	+0.180	15 49.51	1 7.71	3 59	0.54					
	23	3 59	28.76	10.058	20 33	53.8	28.79	3 27.76	0.201	15 49.34	1 7.78	4 2	57.09					
	24	4 3	30.43	10.079	20 45	14.2	27.91	3 22.66	0.222	15 49.17	1 7.85	4 6	53.65					
	25	4 7	32.60	10.100	20 56	13.2	27.01	3 17.06	0.243	15 49.01	1 7.92	4 10	50.21					
	26	4 11	35.25	10.120	21 6	50.6	26.10	3 10.99	0.263	15 48.85	1 7.99	4 14	46.76					
8	27	4 15	38.37	10.139	+21 17	6.1	+25.18	-3 4.44	+0.282	15 48.70	1 8.06	4 18	43.32					
	28	4 19	41.95	10.159	21 26	59.6	24.26	2 57.43	0.301	15 48.55	1 8.13	4 22	39.88					
	29	4 23	45.90	10.177	21 36	30.7	23.33	2 49.99	0.319	15 48.40	1 8.19	4 26	36.43					
	30	4 27	50.45	10.195	21 45	39.3	22.39	2 42.11	0.337	15 48.26	1 8.25	4 30	32.99					
	31	4 31	55.32	10.211	21 54	25.4	21.44	2 33.81	0.354	15 48.12	1 8.31	4 34	29.55					
	1	4 36	0.50	10.227	+22 2	48.6	+20.48	-2 25.12	+0.370	15 47.98	1 8.37	4 38	26.11					
	2	4 40	6.25	10.243	22 10	48.8	19.53	2 16.04	0.386	15 47.85	1 8.43	4 42	22.66					
	3	4 44	12.29	10.259	22 18	25.8	18.55	2 6.58	0.401	15 47.72	1 8.48	4 46	19.22					
	4	4 48	18.09	10.274	22 25	39.4	17.58	1 56.77	0.416	15 47.59	1 8.53	4 50	15.78					
	5	4 52	25.43	10.288	22 32	29.5	16.60	1 46.62	0.430	15 47.47	1 8.58	4 54	12.34					
9	6	4 56	32.51	10.302	+22 38	56.0	+15.61	-1 36.12	+0.444	15 47.35	1 8.63	4 58	8.89					
	7	5 0	39.90	10.315	22 44	58.8	14.63	1 25.31	0.457	15 47.23	1 8.67	5 2	5.45					
	8	5 4	47.62	10.327	22 50	37.7	13.63	1 14.19	0.470	15 47.12	1 8.71	5 6	2.01					
	9	5 8	55.61	10.338	22 55	52.6	12.61	1 2.78	0.481	15 47.01	1 8.75	5 9	58.57					
	10	5 13	3.87	10.349	23 0	43.2	11.60	0 51.11	0.492	15 46.90	1 8.78	5 13	55.13					
	11	5 17	12.40	10.360	+23 5	9.6	+10.59	-0 39.17	+0.502	15 46.79	1 8.81	5 17	51.68					
	12	5 21	21.15	10.369	23 9	11.5	9.57	0 27.02	0.511	15 46.68	1 8.83	5 21	48.24					
	13	5 25	30.11	10.377	23 12	49.1	8.55	0 14.64	0.519	15 46.59	1 8.86	5 25	44.80					
	14	5 29	39.26	10.384	23 16	2.1	7.53	-0 2.09	0.526	15 46.49	1 8.88	5 29	41.36					
	15	5 33	48.58	10.391	23 18	50.4	6.50	+0 10.62	0.532	15 46.40	1 8.90	5 33	37.92					
10	16	5 37	58.02	10.396	+23 21	14.0	+5.47	+0 23.48	+0.538	15 46.32	1 8.91	5 37	34.47					
	17	5 42	7.58	10.400	23 23	12.9	4.44	0 36.45	0.542	15 46.25	1 8.92	5 41	31.03					
	18	5 46	17.21	10.402	23 24	46.9	3.40	0 49.50	0.544	15 46.18	1 8.93	5 45	27.59					
	19	5 50	26.90	10.404	23 25	56.2	2.37	1 2.59	0.546	15 46.11	1 8.94	5 49	24.15					
	20	5 54	36.63	10.405	23 26	40.6	1.38	1 15.71	0.547	15 46.05	1 8.94	5 53	20.71					
	21	5 58	46.34	10.404	+23 27	0.2	+0.30	+1 28.84	+0.546	15 4.99	1 8.94	5 57	17.26					
	22	6 2	56.03	10.402	23 26	55.0	-0.73	1 41.93	0.544	15 45.94	1 8.94	6 1	13.82					
	23	6 7	5.65	10.399	23 26	25.0	1.77	1 54.97	0.541	15 45.90	1 8.93	6 5	10.38					
	24	6 11	15.20	10.395	23 25	30.2	2.80	2 7.91	0.537	15 45.86	1 8.92	6 9	6.94					
	25	6 15	24.63	10.390	23 24	10.7	3.83	2 20.74	0.532	15 45.82	1 8.91	6 13	3.50					
11	26	6 19	33.93	10.385	+23 22	26.4	-4.86	+2 33.46	+0.527	15 45.79	1 8.89	6 17	0.05					
	27	6 23	43.08	10.377	23 20	17.6	5.88	2 46.01	0.519	15 45.77	1 8.87	6 20	56.61					
	28	6 27	52.04	10.369	23 17	44.1	6.90	2 58.38	0.511	15 45.75	1 8.85	6 24	53.17					
	29	6 32	0.80	10.360	23 14	46.3	7.92	3 10.56	0.502	15 45.73	1 8.81	6 28	49.73					
	30	6 36	9.33	10.350	23 11	23.9	8.94	3 22.50	0.493	15 45.72	1 8.78	6 32	46.28					
	1	6 40	17.62	10.340	+23 7	37.2	-9.95	+3 34.19	+0.482	15 45.71	1 8.75	6 36	42.84					
	2	6 44	25.64	10.328	+23 3	26.5	-10.95	+3 45.63	+0.470	15 45.71	1 8.71	6 40	39.40					
12	3	6 48	34.17	10.315	23 0	17.1	11.97	3 57.17	0.457	15 45.70	1 8.67	6 44	35.96					
	4	6 52	42.89	10.300	22 56	7.2	13.00	4 8.16	0.441	15 45.69	1 8.62	6 48	32.61					
	5	6 56	51.61	10.284	22 51	17.3	14.03	4 19.19	0.424	15 45.68	1 8.57	6 52	29.26					
	6	7 0	60.33	10.267	22 45	27.4	15.06	4 30.22	0.407	15 45.67	1 8.52	6 56	25.91					
	7	7 4	69.05	10.249	22 38	37.5	16.09	4 41.25	0.389	15 45.66	1 8.47	7 0	22.56					
	8	7 8	77.77	10.230	22 30	47.6	17.12	4 52.28	0.371	15 45.65	1 8.42	7 4	19.21					
	9	7 12	86.49	10.210	22 22	57.7	18.15	5 3.31	0.353	15 45.64	1 8.37	7 8	15.86					
	10	7 16	95.21	10.189	22 14	67.8	19.18	5 14.34	0.335	15 45.63	1 8.32	7 12	12.51					
	11	7 20	103.93	10.167	22 5	77.9	20.21	5 25.37	0.317	15 45.62	1 8.27	7 16	9.16					
	12	7 24	112.65	10.144	21 55	88.0	21.24	5 36.40	0.299	15 45.61	1 8.22	7 20	5.81					

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.19 from the sidereal interval.

## FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.			Var. per Hour.	Apparent Declination.			Var. per Hour.	Equation of Time. Mean—App.		Var. per Hour.	Semi- diameter.	S. T. of Semi-Pass. Merid.		Sidereal Time of Mean Noon.			
		h	m	s	s	°	'	"	"	m	s	s	'	"	m	s	h	m	s
July	1	6	40	17.62	10.340	+23	7	37.2	− 9.95	+3	34.19	+0.482	15	45.71	1	8.75	6	36	42.84
	2	6	44	25.64	10.328	23	3	26.5	10.95	3	45.63	0.470	15	45.71	1	8.71	6	40	39.40
	3	6	48	33.38	10.316	22	58	51.5	11.95	3	56.76	0.458	15	45.70	1	8.67	6	44	35.96
	4	6	52	40.80	10.303	22	53	52.5	12.95	4	7.61	0.445	15	45.70	1	8.63	6	48	32.52
	5	6	56	47.93	10.290	22	48	29.6	13.95	4	18.15	0.432	15	45.71	1	8.59	6	52	29.07
	6	7	0	54.71	10.276	+22	42	42.9	−14.93	+4	28.34	+0.418	15	45.71	1	8.54	6	56	25.63
	7	7	5	1.15	10.261	22	36	32.7	15.92	4	38.20	0.403	15	45.72	1	8.49	7	0	22.19
	8	7	9	7.24	10.246	22	29	58.7	16.90	4	47.70	0.389	15	45.74	1	8.44	7	4	18.75
	9	7	13	12.96	10.230	22	23	1.5	17.87	4	56.84	0.372	15	45.75	1	8.38	7	8	15.30
	10	7	17	18.28	10.213	22	15	41.0	18.84	5	5.58	0.355	15	45.78	1	8.32	7	12	11.86
	11	7	21	23.21	10.196	+22	7	57.3	−19.79	+5	13.92	+0.338	15	45.81	1	8.26	7	16	8.42
	12	7	25	27.70	10.178	21	59	50.9	20.74	5	21.85	0.321	15	45.84	1	8.20	7	20	4.97
	13	7	29	31.76	10.160	21	51	21.6	21.69	5	29.32	0.302	15	45.87	1	8.14	7	24	1.53
	14	7	33	35.37	10.141	21	42	29.9	22.62	5	36.35	0.283	15	45.91	1	8.07	7	27	58.00
	15	7	37	38.51	10.121	21	33	15.9	23.55	5	42.93	0.264	15	45.95	1	8.00	7	31	54.65
	16	7	41	41.16	10.100	+21	23	39.8	−24.46	+5	49.00	+0.243	15	46.00	1	7.92	7	35	51.21
	17	7	45	43.30	10.078	21	13	41.8	25.36	5	54.57	0.221	15	46.05	1	7.85	7	39	47.76
	18	7	49	44.92	10.056	21	3	22.1	26.26	5	59.62	0.199	15	46.12	1	7.77	7	43	44.32
	19	7	53	46.01	10.034	20	52	41.2	27.15	6	4.14	0.177	15	46.18	1	7.70	7	47	40.88
	20	7	57	46.53	10.011	20	41	39.1	28.02	6	8.10	0.154	15	46.26	1	7.62	7	51	37.43
	21	8	1	46.51	9.987	+20	30	16.1	−28.88	+6	11.51	+0.130	15	46.34	1	7.54	7	55	33.99
	22	8	5	45.92	9.963	20	18	32.5	29.74	6	14.35	0.106	15	46.42	1	7.46	7	59	30.55
	23	8	9	44.73	9.939	20	6	28.4	30.59	6	16.60	0.082	15	46.51	1	7.38	8	3	27.10
	24	8	13	42.96	9.914	19	54	4.3	31.42	6	18.26	0.067	15	46.60	1	7.29	8	7	23.66
	25	8	17	40.59	9.888	19	41	20.4	32.23	6	19.32	0.032	15	46.70	1	7.21	8	11	20.22
	26	8	21	37.60	9.862	+19	28	16.9	−33.04	+6	19.79	+0.006	15	46.80	1	7.13	8	15	16.77
	27	8	25	34.00	9.837	19	14	54.2	33.84	6	19.63	−0.020	15	46.90	1	7.04	8	19	13.33
	28	8	29	29.78	9.811	19	1	12.4	34.63	6	18.86	0.045	15	47.02	1	6.96	8	23	9.89
	29	8	33	24.95	9.785	18	47	11.9	35.40	6	17.47	0.071	15	47.13	1	6.87	8	27	6.44
	30	8	37	19.48	9.759	18	32	53.0	36.16	6	15.46	0.097	15	47.25	1	6.79	8	31	3.00
	31	8	41	13.40	9.733	+18	18	15.9	−36.92	+6	12.82	−0.123	15	47.37	1	6.70	8	34	59.56
Aug.	1	8	45	6.70	9.708	18	3	20.8	37.66	6	9.57	0.148	15	47.50	1	6.61	8	38	56.11
	2	8	48	59.38	9.683	17	48	8.1	38.39	6	5.71	0.173	15	47.62	1	6.53	8	42	52.67
	3	8	52	51.46	9.658	17	32	38.0	39.11	6	1.24	0.198	15	47.75	1	6.44	8	46	49.22
	4	8	56	42.93	9.633	17	16	50.8	39.82	5	56.17	0.223	15	47.88	1	6.35	8	50	45.78
	5	9	0	33.80	9.608	+17	0	46.9	−40.51	+5	50.51	−0.248	15	48.02	1	6.27	8	54	42.34
	6	9	4	24.10	9.584	16	44	26.2	41.20	5	44.26	0.272	15	48.15	1	6.18	8	58	38.89
	7	9	8	13.80	9.559	16	27	49.2	41.87	5	37.44	0.296	15	48.29	1	6.09	9	2	35.45
	8	9	12	2.94	9.536	16	10	56.2	42.54	5	30.04	0.320	15	48.44	1	6.01	9	6	32.00
	9	9	15	51.51	9.512	15	53	47.5	43.18	5	22.08	0.343	15	48.58	1	5.92	9	10	28.56
	10	9	19	39.63	9.489	+15	36	23.4	−43.81	+5	13.56	−0.367	15	48.73	1	5.84	9	14	25.11
	11	9	23	26.98	9.466	15	18	44.2	44.44	5	4.48	0.390	15	48.88	1	5.76	9	18	21.67
	12	9	27	13.89	9.443	15	0	50.2	45.05	4	54.85	0.413	15	49.04	1	5.67	9	22	18.23
	13	9	31	0.24	9.420	14	42	41.6	45.65	4	44.69	0.435	15	49.21	1	5.59	9	26	14.78
	14	9	34	46.06	9.398	14	24	19.0	46.23	4	33.98	0.457	15	49.38	1	5.51	9	30	11.33
	15	9	38	31.35	9.376	+14	5	42.6	−46.80	+4	22.74	−0.479	15	49.55	1	5.44	9	34	7.89
	16	9	42	16.10	9.354	+13	46	52.6	−47.36	+4	10.98	−0.501	15	49.72	1	5.36	9	38	4.44

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

## FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
Aug. 16	9 42 16.10	9.354	+13 46 52.6	-47.36	+ 4 10.98	-0.501	15 49.72	1 5.36	9 38 4.44
17	9 46 0.34	9.333	13 27 49.5	47.89	3 58.69	0.522	15 49.90	1 5.29	9 42 1.00
18	9 49 44.07	9.312	13 8 33.7	48.42	3 45.90	0.543	15 50.09	1 5.21	9 45 57.55
19	9 53 27.29	9.291	12 49 5.4	48.94	3 32.60	0.564	15 50.28	1 5.14	9 49 54.11
20	9 57 10.02	9.271	12 29 24.8	49.43	3 18.82	0.584	15 50.47	1 5.07	9 53 50.66
21	10 0 52.26	9.250	+12 9 32.5	-49.91	+ 3 4.55	-0.604	15 50.67	1 5.00	9 57 47.22
22	10 4 34.03	9.231	11 49 28.8	50.39	2 49.79	0.624	15 50.87	1 4.94	10 1 43.77
23	10 8 15.32	9.211	11 29 13.8	50.85	2 34.58	0.643	15 51.08	1 4.87	10 5 40.32
24	10 11 56.17	9.193	11 8 48.1	51.29	2 18.91	0.662	15 51.29	1 4.81	10 9 36.88
25	10 15 36.58	9.175	10 48 11.9	51.72	2 2.81	0.680	15 51.50	1 4.74	10 13 33.43
26	10 19 16.56	9.157	+10 27 25.6	-52.14	+ 1 46.27	-0.698	15 51.72	1 4.68	10 17 29.99
27	10 22 56.12	9.140	10 6 29.4	52.54	1 29.34	0.714	15 51.94	1 4.63	10 21 26.54
28	10 26 35.28	9.124	9 45 23.7	52.93	1 11.99	0.730	15 52.16	1 4.57	10 25 23.09
29	10 30 14.06	9.109	9 24 8.7	53.31	0 54.27	0.746	15 52.39	1 4.52	10 29 19.65
30	10 33 52.49	9.094	9 2 44.9	53.67	0 38.19	0.760	15 52.61	1 4.47	10 33 16.20
31	10 37 30.57	9.080	+ 8 41 12.4	-54.02	+ 0 17.77	-0.774	15 52.84	1 4.42	10 37 12.76
Sept. 1	10 41 8.33	9.067	8 19 31.6	54.37	- 0 0.98	0.788	15 53.06	1 4.37	10 41 9.31
2	10 44 45.79	9.055	7 57 42.8	54.70	0 20.02	0.799	15 53.29	1 4.33	10 45 5.86
3	10 48 22.97	9.044	7 35 46.1	55.02	0 39.34	0.810	15 53.52	1 4.29	10 49 2.42
4	10 51 59.90	9.034	7 13 41.9	55.32	0 58.91	0.820	15 53.75	1 4.25	10 52 58.97
5	10 55 36.59	9.024	+ 6 51 30.6	-55.61	- 1 18.72	-0.830	15 53.99	1 4.22	10 56 55.52
6	10 59 13.07	9.016	6 29 12.5	55.89	1 38.73	0.838	15 54.22	1 4.18	11 0 52.08
7	11 2 49.37	9.009	6 6 47.8	56.16	1 58.94	0.845	15 54.46	1 4.15	11 4 48.63
8	11 6 25.47	9.002	5 44 16.9	56.41	2 19.33	0.852	15 54.69	1 4.13	11 8 45.18
9	11 10 1.42	8.995	5 21 40.2	56.65	2 39.88	0.859	15 54.93	1 4.10	11 12 41.73
10	11 13 37.23	8.990	+ 4 58 58.0	-56.87	- 3 0.56	-0.864	15 55.18	1 4.08	11 16 38.29
11	11 17 12.94	8.985	4 36 10.4	57.08	3 21.35	0.869	15 55.42	1 4.06	11 20 34.84
12	11 20 48.53	8.981	4 13 18.0	57.28	3 42.26	0.873	15 55.67	1 4.05	11 24 31.39
13	11 24 24.02	8.978	3 50 21.2	57.46	4 3.26	0.876	15 55.92	1 4.03	11 28 27.95
14	11 27 59.46	8.976	3 27 20.2	57.62	4 24.32	0.878	15 56.18	1 4.02	11 32 24.50
15	11 31 34.84	8.974	+ 3 4 15.5	-57.77	- 4 45.44	-0.880	15 56.43	1 4.01	11 36 21.05
16	11 35 10.17	8.972	2 41 7.2	57.91	5 6.60	0.882	15 56.69	1 4.01	11 40 17.61
17	11 38 45.50	8.972	2 17 55.9	58.02	5 27.77	0.882	15 56.96	1 4.01	11 44 14.16
18	11 42 20.82	8.972	1 54 41.8	58.13	5 48.94	0.882	15 57.22	1 4.01	11 48 10.71
19	11 45 56.15	8.973	1 31 25.3	58.23	6 10.11	0.881	15 57.49	1 4.01	11 52 7.26
20	11 49 31.52	8.974	+ 1 8 6.8	-58.30	- 6 31.23	-0.880	15 57.76	1 4.02	11 56 3.82
21	11 53 6.93	8.977	0 44 46.6	58.37	6 52.31	0.877	15 58.03	1 4.03	12 0 0.37
22	11 56 42.42	8.981	+ 0 21 25.1	58.42	7 13.32	0.873	15 58.30	1 4.04	12 3 56.92
23	12 0 18.00	8.985	- 0 1 57.3	58.45	7 34.24	0.869	15 58.58	1 4.06	12 7 53.48
24	12 3 53.67	8.989	0 25 20.5	58.47	7 55.06	0.865	15 58.86	1 4.08	12 11 50.03
25	12 7 29.48	8.995	- 0 48 44.0	-58.48	- 8 15.75	-0.859	15 59.13	1 4.11	12 15 46.58
26	12 11 5.42	9.001	1 12 7.4	58.47	8 36.29	0.853	15 59.41	1 4.14	12 19 43.14
27	12 14 41.54	9.009	1 35 30.4	58.44	8 56.68	0.845	15 59.69	1 4.17	12 23 39.69
28	12 18 17.86	9.018	1 58 52.7	58.41	9 16.87	0.837	15 59.97	1 4.20	12 27 36.24
29	12 21 54.38	9.027	2 22 14.0	58.36	9 36.84	0.827	16 0.24	1 4.23	12 31 32.79
30	12 25 31.14	9.037	- 2 45 34.0	-58.30	- 9 56.57	-0.817	16 0.52	1 4.27	12 35 29.35
Oct. 1	12 29 8.16	9.049	- 3 8 52.5	-58.22	-10 16.05	-0.805	16 0.80	1 4.31	12 39 25.90

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.



## FOR WASHINGTON APPARENT NOON.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sun. Pass Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
Oct. 1	12 29 8.16	9.049	- 3 8 52.5	-58.22	-10 16.05	-0.805	16 0.80	1 4.31	12 39 25.90
2	12 32 45.49	9.062	3 32 9.0	58.14	10 35.22	0.792	16 1.07	1 4.35	12 43 22.45
3	12 36 23.12	9.075	3 55 23.1	58.08	10 54.09	0.779	16 1.35	1 4.40	12 47 19.00
4	12 40 1.10	9.089	4 18 34.6	57.91	11 12.62	0.765	16 1.62	1 4.45	12 51 15.56
5	12 43 39.43	9.105	4 41 43.2	57.78	11 30.79	0.749	16 1.89	1 4.50	12 55 12.11
6	12 47 18.16	9.122	- 5 4 46.3	-57.64	-11 48.56	-0.732	16 2.16	1 4.56	12 59 8.66
7	12 50 57.28	9.139	5 27 49.9	57.48	12 5.95	0.715	16 2.43	1 4.62	13 3 5.22
8	12 54 36.84	9.157	5 50 47.4	57.30	12 22.90	0.697	16 2.70	1 4.68	13 7 1.77
9	12 58 16.83	9.176	6 13 40.4	57.11	12 39.41	0.678	16 2.98	1 4.74	13 10 58.32
10	13 1 57.30	9.196	6 36 28.5	56.90	12 55.46	0.659	16 3.25	1 4.81	13 14 54.88
11	13 5 38.24	9.216	- 6 59 11.5	-56.67	-13 11.02	-0.639	16 3.52	1 4.88	13 18 51.43
12	13 9 19.68	9.238	7 21 49.0	56.43	13 26.10	0.617	16 3.79	1 4.95	13 22 47.98
13	13 13 1.63	9.260	7 44 20.3	56.17	13 40.65	0.595	16 4.06	1 5.03	13 26 44.54
14	13 16 44.12	9.282	8 6 45.2	55.90	13 54.69	0.573	16 4.34	1 5.11	13 30 41.09
15	13 20 27.16	9.305	8 29 3.5	55.61	14 8.17	0.550	16 4.61	1 5.19	13 34 37.64
16	13 24 10.75	9.328	- 8 51 14.5	-55.30	-14 21.08	-0.526	16 4.88	1 5.27	13 38 34.20
17	13 27 54.92	9.352	9 13 17.9	54.98	14 33.43	0.502	16 5.16	1 5.36	13 42 30.76
18	13 31 39.69	9.378	9 35 13.4	54.64	14 45.20	0.478	16 5.43	1 5.44	13 46 27.30
19	13 35 25.05	9.404	9 57 0.5	54.28	14 56.36	0.452	16 5.71	1 5.53	13 50 23.86
20	13 39 11.03	9.430	10 18 38.7	53.90	15 6.90	0.426	16 5.98	1 5.62	13 54 20.41
21	13 42 57.65	9.458	-10 40 7.8	-53.51	-15 16.81	-0.399	16 6.26	1 5.72	13 58 16.96
22	13 46 44.91	9.488	11 1 27.8	53.10	15 26.08	0.373	16 6.53	1 5.82	14 2 13.52
23	13 50 32.80	9.510	11 22 36.7	52.68	15 34.70	0.345	16 6.81	1 5.92	14 6 10.07
24	13 54 21.39	9.538	11 43 35.8	52.23	15 42.65	0.317	16 7.08	1 6.02	14 10 6.63
25	13 58 10.66	9.567	12 4 24.1	51.78	15 49.92	0.289	16 7.35	1 6.12	14 14 3.18
26	14 2 0.62	9.596	-12 25 1.3	-51.31	-15 56.50	-0.259	16 7.62	1 6.23	14 17 59.74
27	14 5 51.30	9.627	12 45 27.0	50.82	16 2.35	0.229	16 7.88	1 6.33	14 21 56.29
28	14 9 42.72	9.658	13 5 40.7	50.31	16 7.48	0.198	16 8.15	1 6.44	14 25 52.84
29	14 13 34.88	9.690	13 25 42.1	49.80	16 11.85	0.166	16 8.40	1 6.55	14 29 49.40
30	14 17 27.81	9.722	13 45 30.9	49.26	16 15.47	0.134	16 8.66	1 6.66	14 33 45.95
31	14 21 21.52	9.755	-14 5 6.7	-48.71	-16 18.31	-0.102	16 8.91	1 6.77	14 37 42.51
Nov. 1	14 25 16.03	9.788	14 24 28.9	48.14	16 20.34	0.068	16 9.16	1 6.89	14 41 39.06
2	14 29 11.35	9.822	14 43 37.4	47.55	16 21.59	0.035	16 9.40	1 7.00	14 45 35.62
3	14 33 7.48	9.856	15 2 31.5	46.95	16 22.01	-0.001	16 9.64	1 7.12	14 49 32.17
4	14 37 4.45	9.891	15 21 11.1	46.34	16 21.59	+0.034	16 9.88	1 7.24	14 53 28.73
5	14 41 2.26	9.926	-15 39 35.7	-45.70	-16 20.34	+0.070	16 10.12	1 7.36	14 57 25.28
6	14 45 0.92	9.962	15 57 44.7	45.04	16 18.24	0.105	16 10.35	1 7.47	15 1 21.84
7	14 49 0.44	9.998	16 15 37.9	44.37	16 15.29	0.141	16 10.59	1 7.59	15 5 18.39
8	14 53 0.81	10.034	16 33 14.8	43.69	16 11.47	0.177	16 10.82	1 7.71	15 9 14.95
9	14 57 2.06	10.070	16 50 34.9	42.99	16 6.81	0.213	16 11.04	1 7.83	15 13 11.51
10	15 1 4.16	10.106	-17 7 37.9	-42.26	-16 1.27	+0.249	16 11.27	1 7.95	15 17 8.06
11	15 5 7.13	10.142	17 24 23.4	41.52	15 54.88	0.285	16 11.49	1 8.07	15 21 4.62
12	15 9 10.95	10.178	17 40 51.0	40.77	15 47.62	0.320	16 11.71	1 8.19	15 25 1.17
13	15 13 15.65	10.213	17 57 0.1	39.99	15 39.51	0.356	16 11.93	1 8.31	15 28 57.73
14	15 17 21.20	10.249	18 12 50.4	39.20	15 30.54	0.391	16 12.14	1 8.42	15 32 54.29
15	15 21 27.60	10.284	-18 28 21.6	-38.39	-15 20.72	+0.426	16 12.36	1 8.54	15 36 50.84
16	15 25 34.85	10.319	-18 43 33.3	-37.57	-15 10.06	+0.461	16 12.57	1 8.66	15 40 47.40

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.18 from the sidereal interval.

## FOR WASHINGTON APPARENT NOON.

etc.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi- diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ' "	"	m s	s	' "	m s	h m s
16	15 25 34.85	10.319	-18 43 33.3	-37.57	-15 10.06	+0.461	16 12.57	1 8.66	15 40 47.40
17	15 29 42.91	10.353	18 58 24.9	36.73	14 58.57	0.496	16 12.78	1 8.78	15 44 43.95
18	15 33 51.83	10.388	19 12 56.1	35.87	14 46.25	0.530	16 12.99	1 8.89	15 48 40.51
19	15 38 1.56	10.422	19 27 6.6	35.00	14 33.12	0.564	16 13.20	1 9.00	15 52 37.07
20	15 42 12.08	10.455	19 40 56.0	34.11	14 19.19	0.597	16 13.40	1 9.12	15 56 33.62
21	15 46 23.40	10.488	-19 54 23.9	-33.21	-14 4.47	+0.630	16 13.60	1 9.23	16 0 30.18
22	15 50 35.51	10.521	20 7 29.9	32.29	13 48.96	0.662	16 13.80	1 9.34	16 4 26.74
23	15 54 48.39	10.553	20 20 13.7	31.36	13 32.68	0.694	16 14.00	1 9.45	16 8 23.29
24	15 59 2.03	10.585	20 32 35.1	30.41	13 15.65	0.726	16 14.18	1 9.56	16 12 19.85
25	16 3 16.42	10.615	20 44 33.5	29.45	12 57.86	0.757	16 14.37	1 9.66	16 16 16.41
26	16 7 31.56	10.646	-20 56 8.6	-28.48	-12 39.33	+0.787	16 14.55	1 9.76	16 20 12.97
27	16 11 47.42	10.676	21 7 20.3	27.49	12 20.07	0.817	16 14.73	1 9.86	16 24 9.52
28	16 16 4.00	10.705	21 18 8.3	26.49	12 0.09	0.847	16 14.89	1 9.96	16 28 6.08
29	16 20 21.90	10.735	21 28 32.1	25.48	11 39.41	0.876	16 15.05	1 10.06	16 32 2.64
30	16 24 39.28	10.763	21 38 31.4	24.46	11 18.05	0.904	16 15.21	1 10.15	16 35 59.19
1	16 28 57.95	10.791	-21 48 6.0	-23.42	-10 56.00	+0.932	16 15.37	1 10.24	16 39 55.75
2	16 33 17.27	10.819	21 57 15.5	22.37	10 33.31	0.959	16 15.52	1 10.33	16 43 52.31
3	16 37 37.23	10.845	22 5 59.7	21.31	10 9.97	0.985	16 15.66	1 10.41	16 47 48.87
4	16 41 57.82	10.870	22 14 18.3	20.34	9 46.01	1.010	16 15.80	1 10.49	16 51 45.43
5	16 46 18.99	10.894	22 22 11.1	19.16	9 21.46	1.035	16 15.93	1 10.57	16 55 41.98
6	16 50 40.75	10.918	-22 29 37.8	-18.06	-8 56.33	+1.058	16 16.06	1 10.64	16 59 38.54
7	16 55 3.04	10.940	22 36 38.2	16.96	8 30.66	1.080	16 16.18	1 10.70	17 3 35.10
8	16 59 25.86	10.961	22 43 11.8	15.85	8 4.46	1.101	16 16.30	1 10.77	17 7 31.66
9	17 3 49.18	10.981	22 49 18.8	14.73	7 37.78	1.121	16 16.41	1 10.83	17 11 28.22
10	17 8 12.95	11.000	22 54 58.8	13.60	7 10.64	1.140	16 16.52	1 10.89	17 15 24.77
11	17 12 37.16	11.016	-23 0 11.5	-12.46	-6 43.07	+1.157	16 16.63	1 10.95	17 19 21.33
12	17 17 1.75	11.032	23 4 56.9	11.81	6 15.10	1.178	16 16.73	1 11.00	17 23 17.89
13	17 21 26.72	11.047	23 9 14.8	10.16	5 46.78	1.197	16 16.84	1 11.04	17 27 14.45
14	17 25 52.00	11.060	23 13 5.0	9.01	5 18.12	1.200	16 16.93	1 11.08	17 31 11.01
15	17 30 17.58	11.071	23 16 27.3	7.85	4 49.18	1.211	16 17.03	1 11.12	17 35 7.56
16	17 34 43.42	11.081	-23 19 21.7	-6.69	-4 19.99	+1.221	16 17.12	1 11.16	17 39 4.12
17	17 39 9.46	11.088	23 21 48.2	5.52	3 50.59	1.228	16 17.20	1 11.18	17 43 0.68
18	17 43 35.68	11.095	23 23 46.6	4.35	3 21.00	1.235	16 17.29	1 11.20	17 46 57.24
19	17 48 2.03	11.100	23 25 16.7	3.17	2 51.29	1.240	16 17.36	1 11.22	17 50 53.80
20	17 52 28.49	11.104	23 26 18.7	2.00	2 21.47	1.244	16 17.43	1 11.24	17 54 50.36
21	17 56 55.03	11.106	-23 26 52.4	-0.82	-1 51.58	+1.246	16 17.50	1 11.25	17 58 46.91
22	18 1 21.58	11.106	23 26 57.9	+0.36	1 21.67	1.246	16 17.57	1 11.25	18 2 43.47
23	18 5 48.14	11.106	23 26 35.1	1.54	0 51.75	1.246	16 17.63	1 11.25	18 6 40.03
24	18 10 14.67	11.103	23 25 44.1	2.71	-0 21.86	1.243	16 17.68	1 11.25	18 10 36.59
25	18 14 41.12	11.100	23 24 24.8	3.89	+0 7.96	1.240	16 17.73	1 11.24	18 14 33.15
26	18 19 7.49	11.096	-23 22 37.4	+5.06	+0 37.68	+1.236	16 17.77	1 11.23	18 18 29.71
27	18 23 33.73	11.090	23 20 21.8	6.24	1 7.28	1.230	16 17.81	1 11.21	18 22 26.26
28	18 27 59.82	11.083	23 17 38.0	7.41	1 36.73	1.228	16 17.83	1 11.19	18 26 22.82
29	18 32 25.72	11.075	23 14 26.2	8.57	2 6.00	1.215	16 17.85	1 11.16	18 30 19.38
30	18 36 51.41	11.066	23 10 46.4	9.74	2 35.05	1.206	16 17.87	1 11.13	18 34 15.94
31	18 41 16.86	11.055	-23 6 38.8	+10.90	+3 3.87	+1.195	16 17.88	1 11.09	18 38 12.50

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0.12 from the sidereal interval.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Ver. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Jan. 1	U	6 57.69	2.019	1 41 56.25	131.34	+16 9 51.5	+698.7	66.95	15 30.6	56 49.4	I. S.
	L	19 22.09	2.048	2 8 22.44	133.07	18 22 30.9	626.5	67.37	15 24.9	56 28.7	
1	U	7 46.85	2.079	2 35 10.38	134.95	20 19 59.8	547.0	67.84	15 19.7	56 9.4	I. S.
2	L	20 11.98	2.110	3 2 20.81	136.78	22 0 54.1	460.9	68.28	15 14.8	55 51.5	
3	U	8 37.47	2.137	3 29 52.32	138.42	+23 23 59.3	+369.1	68.67	15 10.3	55 35.1	I. S.
3	L	21 3.24	2.158	3 57 41.33	139.67	24 28 13.5	272.6	68.95	15 6.2	55 20.0	
4	U	9 29.21	2.169	4 25 42.14	140.37	25 12 49.7	173.0	69.09	15 2.5	55 6.2	I. N.S.
4	L	21 55.26	2.170	4 53 47.52	140.42	25 37 20.5	+ 72.0	69.07	14 59.1	54 53.9	
5	U	10 21.24	2.159	5 21 49.15	139.74	+25 41 39.9	- 28.5	68.87	14 56.1	54 42.7	I. N.S.
5	L	22 47.02	2.136	5 49 38.38	138.35	25 26 4.4	126.9	68.49	14 53.4	54 32.9	
6	U	11 12.46	2.102	6 17 7.00	136.32	24 51 12.3	221.0	67.94	14 51.0	54 24.2	I. N.S.
6	L	23 37.43	2.060	6 44 7.99	133.77	23 58 1.6	309.8	67.27	14 49.0	54 16.8	
7	U	12 1.86	2.011	7 10 35.89	130.84	+22 47 45.4	-391.8	66.50	14 47.3	54 10.5	I. // N.S.
8	L	0 25.68	1.959	7 36 27.23	127.69	21 21 49.2	466.4	65.67	14 45.9	54 5.5	
8	U	12 48.87	1.906	8 1 40.47	124.52	19 41 45.0	533.0	64.82	14 44.9	54 1.8	II. S.
9	L	1 11.42	1.855	8 26 15.98	121.43	17 49 8.1	591.8	64.00	14 44.2	53 59.4	
9	U	13 33.39	1.807	8 50 15.79	118.58	+15 45 33.4	-642.7	63.25	14 44.0	53 58.4	II. S.
10	L	1 54.82	1.765	9 13 43.32	116.07	13 32 33.7	686.1	62.58	14 44.1	53 59.0	
10	U	14 15.79	1.730	9 36 43.17	113.97	11 11 37.5	722.1	62.03	14 44.7	54 1.2	II. S.
11	L	2 36.39	1.704	9 59 20.80	112.38	8 44 9.5	751.4	61.61	14 45.8	54 5.2	
11	U	14 56.72	1.686	10 21 42.44	111.32	+ 6 11 29.6	-774.1	61.34	14 47.4	54 11.0	II. S.
12	L	3 16.90	1.679	10 43 54.89	110.85	3 34 54.2	790.7	61.24	14 49.6	54 18.9	
12	U	15 37.05	1.681	11 6 5.41	111.01	+ 0 55 37.9	801.0	61.32	14 52.3	54 28.9	II. S.
13	L	3 57.30	1.695	11 28 21.75	111.82	- 1 45 5.7	805.2	61.59	14 55.6	54 41.1	
13	U	16 17.77	1.720	11 50 51.99	113.34	- 4 26 0.7	-802.9	62.05	14 59.6	54 55.7	II. S.
14	L	4 38.62	1.757	12 13 44.59	115.56	7 5 48.3	793.7	62.69	15 4.2	55 12.5	
14	U	16 59.99	1.806	12 37 8.35	118.52	9 43 2.0	777.1	63.53	15 9.4	55 31.8	II. S.
15	L	5 22.02	1.868	13 1 12.14	122.24	12 16 5.7	751.9	64.56	15 15.3	55 53.3	
15	U	17 44.87	1.942	13 26 4.89	126.68	-14 43 10.4	-717.0	65.77	15 21.7	56 17.0	II. S.
16	L	6 8.67	2.027	13 51 55.16	131.81	17 2 11.2	671.1	67.13	15 28.8	56 42.8	
16	U	18 33.55	2.122	14 18 50.62	137.53	19 10 46.3	612.4	68.61	15 36.3	57 10.4	II. S.
17	L	6 59.62	2.224	14 46 57.38	143.65	21 6 14.5	539.7	70.16	15 44.2	57 39.4	
17	U	19 26.94	2.329	15 16 19.03	149.96	-22 45 38.5	-451.6	71.72	15 52.4	58 9.4	II. S.
18	L	7 55.50	2.430	15 46 55.61	156.08	24 5 49.8	347.6	73.20	16 0.7	58 39.8	
18	U	20 25.23	2.522	16 18 42.53	161.61	25 3 38.7	228.0	74.50	16 8.9	59 9.9	II. S.
19	L	8 55.96	2.597	16 51 30.05	166.11	25 36 8.6	- 94.9	75.53	16 16.8	59 39.0	
19	U	21 27.46	2.648	17 25 3.23	169.16	-25 40 55.0	+ 48.5	76.23	16 24.2	60 6.2	II. S.
20	L	9 59.40	2.670	17 59 3.07	170.52	25 16 22.6	197.2	76.51	16 30.8	60 30.6	
20	U	22 31.43	2.663	18 33 8.41	170.09	24 22 2.1	345.6	76.37	16 36.5	60 51.5	II. N.
21	L	11 3.20	2.629	19 6 58.57	168.02	22 58 36.4	487.1	75.87	16 41.0	61 8.0	
21	U	23 34.43	2.573	19 40 16.68	164.64	-21 7 59.5	+616.5	75.06	16 44.2	61 19.5	
22	L	12 4.89	2.502	20 12 46.50	160.39	18 53 5.3	729.4	74.03	16 45.8	61 25.6	
23	U	0 34.45	2.424	20 44 23.10	155.69	16 17 31.4	822.8	72.89	16 46.0	61 26.1	
23	L	13 3.06	2.345	21 15 2.69	150.94	13 25 21.3	895.3	71.74	16 44.6	61 20.9	
24	U	1 30.75	2.271	21 44 46.80	146.49	-10 20 47.6	+946.8	70.64	16 41.7	61 10.4	I. S.

Jan. 4, U Defective Illumination of N. 0° 83.  
Jan. 6, U Defective Illumination of S. 0° 32.

Jan. 6, U Defective Illumination of S. 0° 24.  
Jan. 7, U Defective Illumination of II. 0° 01.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Mer- idian.	Geocen- tric Semidi- ameter.	Equa- torial Horiz- ontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
n. 24	U	1 30.75	2.271	21 44 46.80	146.49	-10 20 47.6	+946.8	70.64	16 41.7	61 10.4	I. S.
24	L	13 57.59	2.205	22 13 40.22	142.53	7 7 58.6	978.0	69.67	16 37.5	60 55.1	
25	U	2 23.71	2.150	22 41 49.93	139.22	3 50 49.8	990.4	68.86	16 32.2	60 35.5	I. S.
25	L	14 49.24	2.107	23 9 24.20	136.63	- 0 32 56.7	985.7	68.22	16 25.9	60 12.3	
26	U	3 14.33	2.076	23 36 31.78	134.77	+ 2 42 25.9	+965.7	67.77	16 18.8	59 46.4	I. S.
26	L	15 39.12	2.057	0 3 21.47	133.63	5 52 25.0	932.0	67.50	16 11.2	59 18.6	
27	U	4 3 7.5	2.049	0 30 1.58	133.16	8 54 28.0	886.6	67.41	16 3.4	58 49.7	I. S.
27	L	16 28.34	2.051	0 56 39.67	133.28	11 46 20.5	830.6	67.47	15 55.4	58 20.4	
28	U	4 53.01	2.061	1 23 22.23	133.89	+14 26 4.3	+765.3	67.65	15 47.5	57 51.4	I. S.
28	L	17 17.84	2.078	1 50 14.47	134.87	16 51 54.6	691.8	67.92	15 39.8	57 23.1	
29	U	5 42.90	2.098	2 17 20.04	136.08	19 2 18.7	611.1	68.24	15 32.4	56 56.0	I. S.
29	L	18 8.20	2.119	2 44 40.80	137.37	20 55 55.9	524.0	68.57	15 25.4	56 30.4	
30	U	6 33.76	2.140	3 12 16.70	138.59	+22 31 36.8	+431.9	68.87	15 18.9	56 6.7	I. S.
30	L	18 59.54	2.156	3 40 5.82	139.55	23 48 25.2	335.5	69.11	15 13.0	55 44.9	
31	U	7 25.47	2.165	4 8 4.30	140.12	24 45 39.2	236.4	69.23	15 7.7	55 25.3	I. S.
31	L	19 51.47	2.166	4 36 6.68	140.18	25 22 53.2	135.8	69.22	15 2.9	55 7.7	
eb. 1	U	8 17.42	2.158	5 4 6.38	139.67	+25 39 59.4	+ 35.4	69.04	14 58.6	54 52.3	I. S.
1	L	20 43.21	2.139	5 31 56.21	138.55	25 37 8.7	- 63.4	68.71	14 55.0	54 39.0	
2	U	9 8.71	2.110	5 59 29.01	136.84	25 14 50.1	159.0	68.24	14 52.0	54 27.8	I. N. S.
2	L	21 33.83	2.074	6 26 38.27	134.63	24 33 50.6	250.1	67.63	14 49.4	54 18.4	
3	U	9 58.46	2.031	6 53 18.62	132.03	+23 35 11.0	-335.5	66.92	14 47.4	54 10.9	I. N.
3	L	22 22.55	1.984	7 19 26.17	129.19	22 20 4.6	414.4	66.13	14 45.8	54 5.2	
4	U	10 46.06	1.934	7 44 58.66	126.22	20 49 53.4	486.2	65.32	14 44.7	54 1.1	I. N.
4	L	23 8.97	1.885	8 9 55.54	123.27	19 6 4.6	550.6	64.50	14 44.0	53 58.5	
5	U	11 31.31	1.839	8 34 17.78	120.47	+17 10 8.5	-607.4	63.73	14 43.7	53 57.3	I. N. S.
5	L	23 53.11	1.796	8 58 7.73	117.91	15 3 35.8	656.7	63.01	14 43.7	53 57.5	
6	U	12 14.43	1.759	9 21 28.85	115.67	12 47 56.0	698.6	62.39	14 44.2	53 59.1	I. II. S.
7	L	0 35.35	1.729	9 44 25.56	113.85	10 24 37.5	733.3	61.88	14 45.0	54 2.0	
7	U	12 55.94	1.706	10 7 3.02	112.48	+ 7 55 5.6	-790.8	61.50	14 46.1	54 6.2	II. S.
8	L	1 16.32	1.691	10 29 26.96	111.60	5 20 44.0	781.5	61.27	14 47.6	54 11.8	
8	U	13 36.57	1.686	10 51 43.63	111.27	2 42 54.6	795.5	61.20	14 49.5	54 18.7	II. S.
9	L	1 56.81	1.689	11 13 59.68	111.80	+ 0 2 58.4	802.7	61.29	14 51.8	54 27.0	
9	U	14 17.15	1.703	11 36 22.03	112.32	- 2 37 43.2	-803.0	61.56	14 54.5	54 36.9	II. S.
10	L	2 37.72	1.727	11 58 57.98	113.78	5 17 47.3	796.4	62.00	14 57.6	54 48.3	
10	U	14 58.65	1.762	12 21 55.01	115.84	7 55 47.5	782.3	62.61	15 1.1	55 1.4	II. S.
11	L	3 20.05	1.807	12 45 20.78	118.56	10 30 12.1	760.4	63.39	15 5.1	55 16.1	
11	U	15 42.05	1.862	13 9 22.97	121.91	-12 59 22.6	-729.8	64.34	15 9.6	55 32.6	II. S.
12	L	4 4 7.9	1.928	13 34 9.11	125.88	15 21 31.0	689.9	65.44	15 14.6	55 50.9	
12	U	16 28.37	2.004	13 59 46.27	130.41	17 34 39.1	639.7	66.67	15 20.1	56 11.0	II. S.
13	L	4 52.91	2.087	14 26 20.63	135.39	19 36 36.4	577.9	68.00	15 26.1	56 32.9	
13	U	17 18.47	2.175	14 53 56.90	140.70	-21 25 1.0	-504.0	69.38	15 32.5	56 56.4	II. S.
14	L	5 45.10	2.265	15 22 37.68	146.11	22 57 20.5	417.0	70.76	15 39.3	57 21.3	
14	U	18 12.81	2.352	15 52 22.67	151.35	24 10 57.2	316.9	72.07	15 46.4	57 47.4	II. S.
15	L	6 41.51	2.431	16 23 8.01	156.11	25 3 14.4	204.0	73.23	15 53.7	58 14.4	
15	U	19 11.09	2.497	16 54 45.94	160.06	-25 31 47.9	- 79.9	74.17	16 1.2	58 41.7	II. S.

Feb. 2, U Defective Illumination of S. O' 12.

Feb. 5, U Defective Illumination of S. O' 34.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi- d. Pass- ing Meri- dian.	Geocen- tric Semi- diameter.	Equa- torial Horiz- ontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" ' "	"	s	' "	' "	
Feb. 15	U	19 11.09	2.497	16 54 45.94	160.06	-25 31 47.9	- 79.9	74.17	16 1.2	58 41.7	II. S.
16	L	7 41.35	2.544	17 27 4.85	162.89	25 34 36.8	+ 52.9	74.83	16 8.6	59 8.9	
16	U	20 12.05	2.569	17 59 50.07	164.41	25 10 17.7	190.8	75.16	16 15.8	59 35.3	II. N.
17	L	8 42.92	2.571	18 32 45.27	164.56	24 18 14.6	329.5	75.16	16 22.6	60 0.2	
17	U	21 13.68	2.552	19 5 34.18	163.39	-22 58 47.0	+ 464.1	74.84	16 28.7	60 22.8	II. N.
18	L	9 44.09	2.515	19 38 2.32	161.14	21 13 11.1	590.1	74.27	16 34.0	60 42.3	
18	U	22 13.97	2.464	20 9 58.45	158.12	19 3 34.7	703.5	73.51	16 38.3	60 58.0	II. N.
19	L	10 43.20	2.407	20 41 15.26	154.64	16 32 49.7	801.1	72.63	16 41.4	61 9.3	
19	U	23 11.72	2.347	21 11 49.43	151.05	-13 44 20.0	+ 880.7	71.73	16 43.1	61 15.7	II. N.
20	L	11 39.54	2.290	21 41 41.33	147.63	10 41 50.5	940.9	70.87	16 43.4	61 16.8	
21	U	0 6.71	2.239	22 10 54.21	144.58	7 29 16.3	981.4	70.10	16 42.3	61 12.5	
21	L	12 33.32	2.197	22 39 33.42	142.05	4 10 33.3	1002.5	69.46	16 39.7	61 3.0	
22	U	0 59.48	2.163	23 7 45.67	140.10	- 0 49 30.9	+1004.9	68.97	16 35.7	60 48.6	
22	L	13 25.31	2.143	23 35 38.25	138.77	+ 2 30 13.1	989.7	68.65	16 30.6	60 29.7	
23	U	1 50.94	2.131	0 3 18.60	138.05	5 45 16.7	968.3	68.49	16 24.4	60 7.0	I. S.
23	L	14 16.49	2.128	0 30 53.77	137.89	8 52 34.8	912.3	68.48	16 17.4	59 41.3	
24	U	2 42.05	2.133	0 58 29.97	138.21	+11 49 22.5	+ 853.5	68.59	16 9.8	59 13.3	I. S.
24	L	15 7.71	2.145	1 26 12.32	138.89	14 33 13.2	783.1	68.80	16 1.8	58 43.9	
25	U	3 33.54	2.160	1 54 4.50	139.82	17 1 59.8	703.0	69.08	15 53.7	58 13.8	I. S.
25	L	15 59.57	2.177	2 22 8.49	140.85	19 13 54.6	614.7	69.36	15 45.4	57 43.7	
26	U	4 25.79	2.193	2 50 24.46	141.79	+21 7 29.2	+ 520.0	69.63	15 37.3	57 14.2	I. S.
26	L	16 52.18	2.205	3 18 50.59	142.51	22 41 34.4	420.2	69.83	15 29.6	56 45.9	
27	U	5 18.68	2.211	3 47 23.32	142.86	23 55 21.7	317.3	69.94	15 22.4	56 19.3	I. S.
27	L	17 45.21	2.209	4 15 57.46	142.73	24 48 22.8	212.8	69.91	15 15.6	55 54.6	
28	U	6 11.65	2.197	4 44 26.71	142.04	+25 20 30.0	+ 108.6	69.74	15 9.5	55 32.2	I. S.
28	L	18 37.90	2.176	5 12 44.18	140.77	25 31 56.3	+ 6.3	69.41	15 4.1	55 12.2	
Mar. 1	U	7 3.84	2.146	5 40 43.01	138.95	25 23 13.0	- 92.8	68.92	14 59.3	54 54.7	I. N.S.
1	L	19 29.36	2.107	6 8 16.95	136.64	24 55 8.2	187.1	68.30	14 55.2	54 39.7	
2	U	7 54.39	2.063	6 35 20.86	133.96	+24 8 43.4	- 276.0	67.58	14 51.8	54 27.3	I. N.
2	L	20 18.85	2.014	7 1 51.05	131.04	23 5 10.7	358.4	66.78	14 49.1	54 17.4	
3	U	8 42.72	1.964	7 27 45.40	128.01	21 45 49.1	434.0	65.94	14 47.1	54 9.9	I. N.
3	L	21 5.99	1.914	7 53 3.39	124.99	20 12 2.4	502.6	65.10	14 45.7	54 4.7	
4	U	9 28.66	1.866	8 17 46.01	122.13	+18 25 15.6	- 564.0	64.29	14 44.9	54 1.7	I. N.
4	L	21 50.79	1.822	8 41 55.50	119.50	16 26 54.8	618.3	63.53	14 44.6	54 0.7	
5	U	10 12.42	1.784	9 5 35.23	117.19	14 18 24.5	665.6	62.86	14 44.8	54 1.6	I. N.
5	L	22 33.63	1.752	9 28 49.45	115.25	12 1 8.6	705.9	62.29	14 45.5	54 4.2	
6	U	10 54.49	1.727	9 51 43.04	113.78	+ 9 36 29.7	- 739.5	61.85	14 46.7	54 8.4	I. N.
6	L	23 15.11	1.710	10 14 21.50	112.74	7 5 49.5	766.1	61.54	14 48.2	54 14.1	
7	U	11 35.57	1.701	10 36 50.69	112.22	4 30 29.4	785.9	61.38	14 50.1	54 21.0	I. N.S.
7	L	23 55.98	1.701	10 59 16.85	112.23	+ 1 51 52.3	799.0	61.37	14 52.3	54 29.1	
8	U	12 16.44	1.711	11 21 46.41	112.80	- 0 48 38.2	- 804.0	61.53	14 54.8	54 38.3	I. II. S.
9	L	0 37.07	1.730	11 44 26.05	113.92	3 29 35.1	803.2	61.85	14 57.6	54 48.6	
9	U	12 57.99	1.758	12 7 22.58	115.60	6 9 27.3	794.0	62.33	15 0.7	54 59.8	II. S.
10	L	1 19.30	1.795	12 30 42.85	117.87	8 46 39.3	776.5	62.98	15 4.0	55 11.9	
10	U	13 41.11	1.842	12 54 33.66	120.69	-11 19 29.1	- 750.2	63.78	15 7.6	55 25.0	II. S.

Mar. 1, U Defective Illumination of N. 0° 24.  
r. 2, U Defective Illumination of N. 0° 12.

Mar. 8, U Defective Illumination of I. 0° 31.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" ' "	"	s	" "	" "	
Mar. 10	U	13 41.11	1.842	12 54 33.66	120.69	-11 19 29.1	-750.2	63.78	15 7.6	55 25.0	II. S.
11	L	2 3.54	1.898	13 19 1.58	124.05	13 46 7.4	714.5	64.71	15 11.4	55 39.0	
11	U	14 26.69	1.962	13 44 12.73	127.89	16 4 37.6	608.7	65.77	15 15.4	55 53.9	II. S.
12	L	2 50.65	2.032	14 10 12.42	132.12	18 12 54.6	612.2	66.92	15 19.8	56 9.7	
12	U	15 15.49	2.107	14 37 4.76	136.04	-20 8 46.5	-544.4	68.13	15 24.3	56 26.5	II. S.
13	L	3 41.23	2.184	15 4 52.12	141.26	21 49 55.6	465.0	69.34	15 29.1	56 44.2	
13	U	16 7.90	2.259	15 33 34.61	145.79	23 14 1.9	374.1	70.52	15 34.2	57 2.8	II. S.
14	L	4 35.44	2.329	16 3 9.63	149.96	24 18 48.5	271.9	71.59	15 39.5	57 22.2	
14	U	17 3.75	2.389	16 33 31.54	153.56	-25 2 8.4	-159.8	72.50	15 45.0	57 42.3	II. S.
15	L	5 32.70	2.434	17 4 31.70	156.31	25 22 12.7	-39.8	73.18	15 50.6	58 3.0	
15	U	18 2.11	2.463	17 35 58.96	158.06	25 17 39.8	+85.9	73.61	15 56.3	58 23.9	II. N.S.
16	L	6 31.75	2.474	18 7 40.54	158.70	24 47 41.4	213.8	73.77	16 2.1	58 44.9	
16	U	19 1.41	2.466	18 39 23.24	158.25	-23 52 10.2	+340.8	73.65	16 7.7	59 5.5	II. N.
17	L	7 30.88	2.443	19 10 54.79	156.86	22 31 40.2	463.1	73.29	16 13.1	59 25.2	
17	U	20 0.00	2.408	19 42 5.02	154.74	20 47 26.5	577.6	72.75	16 18.1	59 43.7	II. N.
18	L	8 28.64	2.365	20 12 46.62	152.14	18 41 20.1	681.5	72.08	16 22.6	60 0.3	
18	U	20 56.74	2.318	20 42 55.45	149.33	-16 15 43.2	+772.4	71.35	16 26.5	60 14.5	II. N.
19	L	9 24.28	2.272	21 12 30.59	146.55	13 33 21.4	848.6	70.63	16 29.6	60 25.8	
19	U	21 51.29	2.230	21 41 33.76	144.03	10 37 19.1	909.0	69.96	16 31.7	60 33.6	II. N.
20	L	10 17.83	2.195	22 10 8.90	141.91	7 30 52.1	952.6	69.38	16 32.7	60 37.6	
20	U	22 44.00	2.168	22 38 21.51	140.29	-4 17 23.7	+979.1	68.95	16 32.7	60 37.4	II. N.
21	L	11 9.90	2.151	23 6 18.13	139.24	-1 0 20.6	988.4	68.67	16 31.5	60 32.9	
21	U	23 35.65	2.143	23 34 5.69	138.78	+2 16 51.5	980.7	68.54	16 29.1	60 24.1	
22	L	12 1.36	2.145	0 1 51.12	138.80	5 30 51.0	956.5	68.55	16 25.5	60 11.1	
23	U	0 27.15	2.155	0 29 40.83	139.49	+8 38 23.9	+916.4	68.71	16 20.9	59 54.3	
23	L	12 53.10	2.171	0 57 40.33	140.49	11 36 26.1	861.6	68.97	16 15.5	59 34.2	
24	U	1 19.28	2.193	1 25 53.83	141.79	14 22 7.9	793.3	69.33	16 9.2	59 11.2	I. S.
24	L	13 45.74	2.217	1 54 23.83	143.22	16 52 56.1	712.9	69.71	16 2.3	58 46.0	
25	U	2 12.48	2.240	2 23 10.90	144.00	+19 6 37.5	+822.3	70.09	15 55.0	58 19.2	I. S.
25	L	14 39.48	2.259	2 52 13.42	145.76	21 1 21.2	823.7	70.41	15 47.5	57 51.7	
26	U	3 6.67	2.272	3 21 27.60	146.52	22 35 41.5	419.0	70.64	15 40.0	57 24.0	I. S.
26	L	15 33.96	2.275	3 50 47.65	146.72	23 48 40.3	310.5	70.73	15 32.6	56 56.7	
27	U	4 1.22	2.267	4 20 6.27	146.27	+24 39 47.8	+200.8	70.64	15 25.4	56 30.4	I. S.
27	L	16 28.32	2.248	4 49 15.23	145.11	25 9 1.8	+92.0	70.38	15 18.6	56 5.5	
28	U	4 55.13	2.217	5 18 6.17	143.27	25 16 46.7	-13.8	69.94	15 12.3	55 42.5	I. S.
28	L	17 21.50	2.177	5 46 31.28	140.82	25 3 49.1	114.8	69.33	15 6.6	55 21.6	
29	U	5 47.34	2.128	6 14 24.02	137.90	+24 31 14.3	-209.9	68.60	15 1.6	55 3.2	I. N.
29	L	18 12.56	2.074	6 41 39.61	134.66	23 40 20.5	297.9	67.76	14 57.3	54 47.3	
30	U	6 37.11	2.018	7 8 15.08	131.24	22 32 34.5	878.5	66.86	14 53.7	54 34.1	I. N.
30	L	19 0.98	1.961	7 34 9.45	127.84	21 9 26.9	451.5	65.95	14 50.9	54 23.7	
31	U	7 24.18	1.906	7 59 23.51	124.55	+19 32 28.7	-516.9	65.04	14 48.7	54 15.9	I. N.
31	L	19 46.75	1.856	8 23 59.63	121.52	17 43 9.0	575.1	64.20	14 47.4	54 10.9	
Apr. 1	U	8 8.75	1.811	8 48 1.37	118.83	15 42 53.6	626.3	63.44	14 46.7	54 8.5	I. N.
1	L	20 30.25	1.774	9 11 33.32	116.57	13 33 5.0	670.7	62.78	14 46.7	54 8.5	
2	U	8 51.35	1.744	9 34 40.81	114.77	+11 15 2.3	-708.7	62.24	14 47.4	54 10.9	I. N.



FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" ' "	"	s	" "	" "	
Apr. 2	U	8 51.35	1.744	9 34 40.81	114.77	+11 15 2.3	-708.7	62.24	14 47.4	54 10.9	I. N.
2	L	21 12.13	1.723	9 57 29.69	113.47	8 50 2.2	740.4	61.84	14 48.6	54 15.5	
3	U	9 32.71	1.710	10 20 6.25	112.71	6 19 19.8	765.8	61.59	14 50.4	54 22.1	I. N.
3	L	21 53.20	1.706	10 42 37.06	112.51	3 44 11.4	784.7	61.50	14 52.7	54 30.5	
4	U	10 13.70	1.712	11 5 8.92	112.88	+ 1 55 4.4	-797.0	61.58	14 55.5	54 40.5	I. N.
4	L	22 34.34	1.728	11 27 48.74	113.85	- 1 34 9.4	802.4	61.82	14 58.5	54 51.8	
5	U	10 55.23	1.754	11 50 43.58	115.39	4 14 33.9	800.3	62.22	15 1.9	55 4.3	I. N.S.
5	L	23 16.48	1.789	12 14 0.46	117.52	6 53 45.7	790.2	62.80	15 5.6	55 17.8	
6	U	11 38.21	1.834	12 37 46.36	120.22	- 9 30 3.3	-771.2	63.53	15 9.5	55 32.1	I. S.
7	L	0 0.54	1.888	13 2 7.96	123.47	12 136.4	742.6	64.40	15 13.5	55 46.9	
7	U	12 23.56	1.950	13 27 11.45	127.20	14 26 24.5	703.6	65.41	15 17.7	56 2.0	II. S.
8	L	0 47.37	2.019	13 53 2.21	131.32	16 42 17.8	653.3	66.50	15 21.8	56 17.4	
8	U	13 12.04	2.092	14 19 44.35	135.73	-18 46 58.0	-591.3	67.67	15 26.1	56 32.9	II. S.
9	L	1 37.59	2.167	14 47 20.30	140.26	20 38 0.8	517.1	68.85	15 30.3	56 48.3	
9	U	14 4.05	2.241	15 15 50.17	144.68	22 12 59.9	430.7	70.00	15 34.5	57 3.7	II. S.
10	L	2 31.35	2.309	15 45 11.29	148.76	23 29 32.9	333.0	71.05	15 38.6	57 18.9	
10	U	14 59.42	2.367	16 15 18.06	152.24	-24 25 28.9	-224.8	71.94	15 42.7	57 33.8	II. S.
11	L	3 28.10	2.411	16 46 1.77	154.89	24 58 56.3	-108.6	72.62	15 46.7	57 48.5	
11	U	15 57.20	2.438	17 17 11.22	156.51	25 8 31.9	+ 13.2	73.05	15 50.6	58 2.9	II. S.
12	L	4 26.52	2.446	17 48 33.52	157.02	24 53 27.7	137.6	73.20	15 54.4	58 17.0	
12	U	16 55.84	2.436	18 19 55.41	156.45	-24 13 34.3	+290.9	73.09	15 58.1	58 30.5	II. N.S.
13	L	5 24.94	2.411	18 51 4.47	154.92	23 9 22.9	380.0	72.73	16 1.7	58 43.6	
13	U	17 53.65	2.373	19 21 50.40	152.64	21 42 1.4	492.1	72.18	16 5.1	58 56.0	II. N.
14	L	6 21.86	2.327	19 52 5.74	149.87	19 53 9.5	594.8	71.50	16 8.2	59 7.5	
14	U	18 49.49	2.277	20 21 46.24	146.87	-17 44 51.2	+686.2	70.75	16 11.1	59 18.0	II. N.
15	L	7 16.52	2.228	20 50 50.82	143.91	15 19 29.5	765.2	69.99	16 13.6	59 27.3	
15	U	19 42.98	2.183	21 19 21.23	141.21	12 39 39.0	830.9	69.28	16 15.7	59 35.0	II. N.
16	L	8 8.94	2.145	21 47 21.43	138.91	9 48 2.8	882.8	68.67	16 17.3	59 40.9	
16	U	20 34.50	2.116	22 14 57.14	137.14	- 6 47 29.2	+920.3	68.18	16 18.3	59 44.7	II. N.
17	L	8 59.76	2.096	22 42 15.17	135.97	3 40 49.7	943.7	67.85	16 18.7	59 46.1	
17	U	21 24.85	2.087	23 9 22.99	135.44	- 0 30 58.3	952.4	67.68	16 18.4	59 44.9	II. N.
18	L	9 49.90	2.089	23 36 28.30	135.55	+ 2 39 9.2	946.4	67.68	16 17.3	59 40.9	
18	U	22 15.03	2.101	0 3 38.56	136.26	+ 5 46 36.6	+925.7	67.84	16 15.5	59 34.1	II. N.
19	L	10 40.35	2.122	0 31 0.61	137.50	8 48 27.8	890.4	68.13	16 12.8	59 24.3	
19	U	23 5.97	2.150	0 58 40.33	139.18	11 41 49.3	840.9	68.55	16 9.4	59 11.7	
20	L	11 31.96	2.182	1 26 42.12	141.15	14 23 53.2	777.6	69.04	16 5.2	58 56.4	
20	U	23 58.36	2.217	1 55 8.53	143.26	+16 51 59.9	+701.5	69.57	16 0.4	58 38.7	
21	L	12 25.17	2.251	2 23 59.89	145.28	19 3 43.8	614.0	70.08	15 55.0	58 19.0	
22	U	0 52.36	2.280	2 53 14.05	147.01	20 56 57.4	516.8	70.52	15 49.2	57 57.6	
22	L	13 19.85	2.300	3 22 46.22	148.26	22 29 56.9	412.0	70.85	15 43.0	57 35.1	
23	U	1 47.52	2.310	3 52 29.28	148.81	+23 41 27.5	+302.4	71.01	15 36.7	57 11.9	I. S.
23	L	14 15.22	2.305	4 22 14.23	148.55	24 30 45.4	190.5	70.98	15 30.4	56 48.6	
24	U	2 42.79	2.287	4 51 50.95	147.43	24 57 40.7	+ 79.0	70.74	15 24.1	56 25.7	I. S.
24	L	15 10.05	2.254	5 21 9.19	145.48	25 2 35.0	- 29.3	70.29	15 18.1	56 3.5	
25	U	3 36.84	2.209	5 49 59.51	142.80	+24 46 18.6	-132.4	69.65	15 12.4	55 42.6	I. S.

April 5, U Defective Illumination of S. 0° 24.

April 12, U Defective Illumination of S. 0° 23.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Mer- idian.	Geocen- tric Semidim- eter.	Equa- torial Horiz- ontal Parallax.	Bright Limbs.
pr.25	U	h m 3 36.84	m 2.209	h m s 5 49 59.51	s 142.80	+24 46 18.6	-132.4	69.65	15 12.4	55 42.6	I. S.
25	L	16 3.04	2.156	6 18 14.11	139.56	24 10 4.4	228.7	68.85	15 7.1	55 23.4	
26	U	4 28.55	2.096	6 45 47.32	135.93	23 15 21.8	317.1	67.95	15 2.4	55 6.0	I. N.
26	L	16 53.32	2.033	7 12 35.84	132.14	22 3 49.0	397.0	66.99	14 58.3	54 50.9	
27	U	5 17.33	1.970	7 38 38.71	128.36	+20 37 8.4	-468.4	66.01	14 54.8	54 38.3	I. N.
27	L	17 40.60	1.910	8 3 57.12	124.75	18 57 1.1	531.4	65.06	14 52.1	54 28.2	
28	U	6 3.18	1.855	8 28 33.96	121.45	17 5 4.0	586.7	64.17	14 50.1	54 20.8	I. N.
28	L	18 25.15	1.807	8 52 33.54	118.56	15 2 48.2	634.7	63.38	14 48.8	54 16.1	
29	U	6 46.58	1.767	9 16 1.23	116.15	+12 51 38.4	-675.8	62.70	14 48.3	54 14.2	I. N.
29	L	19 7.58	1.736	9 39 3.15	114.27	10 32 53.6	710.6	62.16	14 48.5	54 15.1	
30	U	7 28.27	1.714	10 1 45.96	112.97	8 7 48.0	739.3	61.78	14 49.5	54 18.6	I. N.
30	L	19 48.75	1.702	10 24 16.77	112.27	5 37 33.2	762.2	61.56	14 51.1	54 24.7	
May 1	U	8 9.16	1.701	10 46 42.86	112.19	+ 3 3 18.9	-779.2	61.50	14 53.4	54 33.2	I. N.
1	L	20 29.62	1.710	11 9 11.82	112.74	+ 0 26 16.7	790.1	61.63	14 56.4	54 44.0	
2	U	8 50.25	1.730	11 31 51.32	113.95	- 2 12 18.4	794.6	61.94	14 59.9	54 56.8	I. N.
2	L	21 11.18	1.761	11 54 49.14	115.80	4 51 5.3	792.0	62.42	15 3.9	55 11.4	
3	U	9 32.55	1.802	12 18 13.08	118.30	- 7 28 35.2	-781.5	63.08	15 8.3	55 27.6	I. N.
3	L	21 54.48	1.854	12 42 10.81	121.43	10 3 8.8	762.5	63.90	15 13.0	55 44.9	
4	U	10 17.10	1.916	13 6 49.65	125.14	12 32 54.6	733.4	64.88	15 18.0	56 3.2	I. N.
4	L	22 40.51	1.987	13 32 16.35	129.39	14 55 47.9	693.5	65.98	15 23.1	56 22.0	
5	U	11 4.81	2.064	13 58 36.61	134.05	-17 9 30.7	-641.5	67.18	15 28.3	56 41.1	I. N.S.
5	L	23 30.06	2.146	14 25 54.58	139.98	19 11 33.2	576.6	68.44	15 33.5	57 0.1	
6	U	11 56.31	2.229	14 54 12.15	143.95	20 59 16.5	496.3	69.69	15 38.5	57 18.6	I. II. S.
7	L	0 23.54	2.308	15 23 28.39	148.71	22 29 59.4	406.6	70.88	15 43.3	57 36.3	
7	U	12 51.67	2.378	15 53 38.90	152.94	-23 41 5.6	-302.4	71.94	15 47.9	57 53.1	II. S.
8	L	1 20.56	2.435	16 24 35.60	156.35	24 30 15.1	187.6	72.79	15 52.1	58 8.5	
8	U	13 50.03	2.474	16 56 6.98	158.67	24 55 34.8	- 64.7	73.37	15 55.9	58 22.5	II. S.
9	L	2 19.84	2.491	17 27 58.74	159.73	24 55 49.5	+ 62.7	73.65	15 59.3	58 35.0	
9	U	14 49.73	2.487	17 59 55.31	159.47	-24 30 29.0	+190.5	73.63	16 2.3	58 45.8	II. N.S.
10	L	3 19.44	2.462	18 31 41.35	158.01	23 39 51.4	314.8	73.31	16 4.8	58 55.0	
10	U	15 48.76	2.421	19 3 3 3.39	155.52	22 25 0.9	432.1	72.73	16 6.8	59 2.5	II. N.
11	L	4 17.51	2.368	19 33 51.02	152.32	20 47 40.4	539.5	71.98	16 8.4	59 8.4	
11	U	16 45.57	2.308	20 3 57.58	148.73	-18 50 2.5	+634.7	71.12	16 9.6	59 12.8	II. N.
12	L	5 12.90	2.247	20 33 20.20	145.05	16 34 39.5	716.9	70.22	16 10.4	59 15.7	
12	U	17 39.51	2.189	21 1 59.50	141.55	14 4 13.7	785.2	69.34	16 10.8	59 17.2	II. N.
13	L	6 5.46	2.137	21 29 58.92	138.44	11 21 31.7	839.5	68.56	16 10.9	59 17.3	
13	U	18 30.83	2.094	21 57 24.04	135.86	- 8 29 19.2	+880.3	67.89	16 10.6	59 16.2	II. N.
14	L	6 55.76	2.062	22 24 21.96	133.91	5 30 18.6	907.7	67.37	16 9.9	59 13.8	
14	U	19 20.37	2.041	22 51 0.70	132.67	- 2 27 8.9	921.8	67.03	16 8.9	59 10.0	II. N.
15	L	7 44.80	2.032	23 17 28.71	132.12	+ 0 37 34.2	923.3	66.87	16 7.5	59 4.9	
15	U	20 9.19	2.035	23 43 54.47	132.29	+ 3 41 17.4	+911.8	66.88	16 5.7	58 58.5	II. N.
16	L	8 33.68	2.049	0 10 26.16	133.11	6 41 29.0	887.9	67.07	16 3.6	58 50.6	
16	U	20 58.39	2.072	0 37 11.32	134.51	9 35 37.6	851.4	67.41	16 1.1	58 41.3	II. N.
17	L	9 23.43	2.103	1 4 16.40	136.41	12 21 12.5	802.4	67.87	15 58.1	58 30.4	
17	U	21 48.89	2.141	1 31 46.45	138.65	+14 55 45.4	+741.1	68.41	15 54.8	58 18.2	II. N.

May 5, U Defective Illumination of N. 0°.11.

May 9, U Defective Illumination of N. 0° 23.



## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Meridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" "	" "	s	" "	" "	
May 17	U	21 48.89	2.141	1 31 46.45	138.65	+14 55 45.4	+741.1	68.41	15 54.8	58 18.2	I. N.
18	L	10 14.82	2.181	1 59 44.64	141.06	17 16 51.6	668.1	69.00	15 51.0	58 4.5	
18	U	22 41.23	2.220	2 28 11.93	143.45	19 22 14.2	584.0	69.58	15 46.9	57 49.5	I. N.
19	L	11 8.10	2.256	2 57 6.62	145.59	21 9 48.9	490.3	70.10	15 42.5	57 33.3	
19	U	23 35.35	2.284	3 26 24.31	147.25	+22 37 49.9	+388.6	70.51	15 37.8	57 16.1	
20	L	12 2.86	2.300	3 55 57.95	148.22	23 44 55.3	281.5	70.74	15 32.9	56 58.1	
21	U	0 30.49	2.302	4 25 38.30	148.35	24 30 12.7	171.2	70.78	15 27.9	56 39.7	
21	L	12 58.05	2.289	4 55 14.68	147.56	24 53 22.0	+ 60.6	70.60	15 22.9	56 21.1	
22	U	1 25.36	2.260	5 24 36.02	146.85	+24 54 37.2	- 47.5	70.20	15 17.8	56 2.6	I. S.
22	L	13 52.24	2.219	5 53 31.85	143.33	24 34 42.4	150.7	69.59	15 12.9	55 44.7	
23	U	2 18.56	2.166	6 21 53.26	140.15	23 54 48.0	247.2	68.82	15 8.3	55 27.6	I. N.
23	L	14 44.19	2.105	6 49 33.53	136.51	22 56 24.1	335.4	67.92	15 3.9	55 11.6	
24	U	3 9.06	2.041	7 16 28.50	132.64	+21 41 13.3	-414.9	66.95	15 0.0	54 57.1	I. N.
24	L	15 33.16	1.976	7 42 36.54	128.72	20 11 3.4	485.2	65.95	14 56.5	54 44.3	
25	U	3 56.49	1.913	8 7 58.35	124.95	18 27 43.0	546.7	64.98	14 53.5	54 33.5	I. N.
25	L	16 19.09	1.855	8 32 36.57	121.48	16 32 55.5	599.9	64.07	14 51.2	54 24.9	
26	U	4 41.04	1.804	8 56 35.41	118.40	+14 28 18.9	-645.1	63.26	14 49.5	54 18.7	I. N.
26	L	17 2.43	1.761	9 20 0.29	115.83	12 15 23.2	683.1	62.56	14 48.5	54 15.0	
27	U	5 23.35	1.728	9 42 57.46	113.80	9 55 31.3	714.5	62.01	14 48.2	54 13.9	I. N.
27	L	17 43.93	1.704	10 5 33.83	112.37	7 29 59.0	739.3	61.62	14 48.6	54 15.5	
28	U	6 4.28	1.690	10 27 56.74	111.56	+ 4 59 58.0	-759.4	61.39	14 49.8	54 19.9	I. N.
28	L	18 24.54	1.688	10 50 13.84	111.41	+ 2 26 36.2	773.3	61.35	14 51.8	54 27.0	
29	U	6 44.84	1.696	11 12 33.08	111.92	- 0 8 58.5	781.5	61.48	14 54.4	54 36.8	I. N.
29	L	19 5.30	1.716	11 35 2.60	113.12	2 45 36.5	783.8	61.80	14 57.8	54 49.1	
30	U	7 26.07	1.748	11 57 50.69	115.02	- 5 22 3.8	-779.6	62.31	15 1.8	55 3.9	I. N.
30	L	19 47.29	1.791	12 21 5.74	117.61	7 56 58.9	768.2	63.01	15 6.5	55 21.0	
31	U	8 9.10	1.846	12 44 56.12	120.90	10 28 50.1	748.8	63.89	15 11.7	55 40.0	I. N.
31	L	20 31.63	1.911	13 9 30.00	124.86	12 55 52.7	719.9	64.92	15 17.3	56 0.8	
June 1	U	8 55.02	1.987	13 34 55.06	129.42	-15 16 7.6	-680.6	66.10	15 23.4	56 23.0	I. N.
1	L	21 19.36	2.071	14 1 17.95	134.47	17 27 19.7	629.3	67.40	15 29.7	56 46.1	
2	U	9 44.75	2.161	14 28 43.86	139.88	19 26 58.0	564.8	68.76	15 36.1	57 9.8	I. N.
2	L	22 11.24	2.253	14 57 15.61	145.41	21 12 18.4	486.3	70.13	15 42.6	57 33.5	
3	U	10 38.81	2.342	15 26 52.96	150.75	-22 40 29.5	-393.3	71.43	15 48.9	57 56.7	I. N.S.
3	L	23 7.41	2.422	15 57 31.73	155.58	23 48 40.7	286.5	72.60	15 55.0	58 18.9	
4	U	11 36.89	2.488	16 29 3.47	159.53	24 34 15.5	167.5	73.54	16 0.6	58 39.6	I. N.S.
4	L	0 7.03	2.533	17 1 15.53	162.26	24 55 4.8	- 39.5	74.19	16 5.7	58 58.3	
5	U	12 37.58	2.555	17 33 51.86	163.55	-24 49 41.4	+ 93.8	74.50	16 10.1	59 14.6	II. N.S.
6	L	1 8.24	2.551	18 6 34.58	163.32	24 17 30.7	227.7	74.46	16 13.8	59 28.2	
6	U	13 38.71	2.524	18 39 5.98	161.09	23 18 55.0	357.2	74.09	16 16.7	59 38.9	II. N.S.
7	L	2 8.73	2.477	19 11 10.39	158.88	21 55 12.6	478.1	73.44	16 18.8	59 46.4	
7	U	14 38.10	2.416	19 42 35.73	155.24	-20 8 28.6	+586.9	72.59	16 20.0	59 50.9	II. N.
8	L	3 6.69	2.348	20 13 14.30	151.14	18 1 23.2	681.4	71.62	16 20.4	59 52.3	
8	U	15 34.45	2.279	20 43 2.78	146.95	15 36 57.5	760.2	70.61	16 20.1	59 51.0	II. N.
9	L	4 1.39	2.212	21 12 1.80	142.95	12 58 23.1	822.9	69.64	16 19.0	59 47.0	
9	U	16 27.57	2.153	21 40 15.16	139.37	-10 8 51.5	+869.8	68.75	16 17.3	59 40.8	II. N.

June 4, U Defective Illumination of N. 0° 58.  
June 6, U Defective Illumination of N. 0° 58.

June 6, U Defective Illumination of S. 0° 51.

## MOON-CULMINATIONS, 1917.

529

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi- d. Pass- ing Mer- idian.	Geocen- tric Semi- diameter.	Equa- torial Hor- izontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" " "	"	s	" "	" "	
une 9	U	16 27.57	2.153	21 40 15.16	139.37	-10 8 51.5	+869.8	68.75	16 17.3	59 40.8	I. N.
10	L	4 53.09	2.103	22 7 48.93	136.37	7 11 27.9	901.7	68.00	16 15.0	59 32.6	
10	U	17 18.09	2.064	22 34 50.77	134.06	4 9 8.5	919.3	67.41	16 12.3	59 22.7	I. N.
11	L	5 42.69	2.038	23 1 29.17	132.47	-1 4 39.4	923.4	67.01	16 9.3	59 11.5	
11	U	18 7.05	2.024	23 27 53.03	131.63	+1 59 23.6	+915.0	66.79	16 5.9	58 59.1	I. N.
12	L	6 31.31	2.022	23 54 11.21	131.52	5 0 32.6	894.5	66.75	16 2.3	58 45.9	
12	U	18 55.62	2.032	0 20 32.15	132.09	7 56 26.4	862.5	66.89	15 58.6	58 32.1	I. N.
13	L	7 20.11	2.051	0 47 3.57	133.25	10 44 49.7	819.4	67.17	15 54.6	58 17.7	
13	U	19 44.88	2.079	1 13 52.14	134.92	+13 23 30.0	+765.5	67.58	15 50.6	58 3.0	I. N.
14	L	8 10.02	2.113	1 41 3.13	136.96	15 50 18.8	700.9	68.09	15 46.5	57 47.9	
14	U	20 35.59	2.150	2 8 40.02	139.20	18 3 12.4	626.3	68.63	15 42.3	57 32.6	I. N.
15	L	9 1.62	2.187	2 36 44.11	141.46	20 0 14.0	542.4	69.17	15 38.1	57 17.2	
15	U	21 28.08	2.221	3 5 14.25	143.51	+21 39 36.8	+450.0	69.66	15 33.9	57 1.6	I. N.
16	L	9 54.91	2.249	3 34 6.72	145.15	22 59 48.6	350.8	70.04	15 29.7	56 46.0	
16	U	22 22.01	2.265	4 3 15.22	146.15	23 59 37.6	246.6	70.27	15 25.4	56 30.3	I. N.
17	L	10 49.23	2.269	4 32 31.35	146.40	24 38 16.7	139.6	70.30	15 21.1	56 14.7	
17	U	23 16.41	2.259	5 1 45.23	145.77	+24 55 27.2	+32.2	70.13	15 16.9	55 59.3	
18	L	11 43.39	2.234	5 30 46.39	144.28	24 51 19.8	-72.9	69.75	15 12.8	55 44.2	
19	U	0 9.98	2.196	5 59 24.76	141.99	24 26 34.5	173.7	69.17	15 8.8	55 29.5	
19	L	12 36.05	2.147	6 27 31.60	139.05	23 42 16.6	268.0	68.41	15 5.0	55 15.5	
20	U	1 1.49	2.091	6 55 0.08	135.64	+22 39 51.1	-354.7	67.57	15 1.4	55 2.2	I. N.
20	L	13 26.21	2.029	7 21 45.72	131.95	21 20 56.9	432.8	66.63	14 58.0	54 49.9	
21	U	1 50.19	1.967	7 47 46.46	128.18	19 47 20.6	501.8	65.67	14 55.0	54 38.8	I. N.
21	L	14 13.42	1.906	8 13 2.39	124.51	18 0 50.7	561.7	64.72	14 52.3	54 29.0	
22	U	2 35.94	1.849	8 37 35.67	121.09	+16 3 13.4	-613.1	63.82	14 50.1	54 20.9	I. N.
22	L	14 57.81	1.798	9 1 29.98	118.03	13 56 9.3	656.2	63.02	14 48.4	54 14.5	
23	U	3 19.12	1.755	9 24 50.23	115.43	11 41 13.4	691.8	62.33	14 47.2	54 10.1	I. N.
23	L	15 39.96	1.720	9 47 42.24	113.34	9 19 52.5	720.5	61.78	14 46.5	54 7.8	
24	U	4 0.44	1.695	10 10 12.54	111.82	+6 53 27.1	-742.7	61.38	14 46.5	54 7.8	I. N.
24	L	16 20.67	1.679	10 32 28.16	110.89	4 23 11.7	758.9	61.15	14 47.2	54 10.2	
25	U	4 40.78	1.675	10 54 36.52	110.61	+1 50 16.8	709.3	61.09	14 48.6	54 15.2	I. N.
25	L	17 0.90	1.681	11 16 45.34	110.98	-0 44 9.6	774.1	61.21	14 50.6	54 22.8	
26	U	5 21.16	1.698	11 39 2.59	112.02	-3 18 58.9	-773.2	61.51	14 53.4	54 33.0	I. N.
26	L	17 41.70	1.727	12 1 36.48	113.76	5 53 0.5	766.0	62.01	14 56.9	54 45.9	
27	U	6 2.65	1.767	12 24 35.37	116.19	8 24 58.1	752.3	62.69	15 1.2	55 1.4	I. N.
27	L	18 24.16	1.820	12 48 7.72	119.32	10 53 27.2	731.3	63.55	15 6.1	55 19.5	
28	U	6 46.37	1.883	13 12 21.89	123.15	-13 16 53.3	-701.6	64.58	15 11.6	55 39.9	I. N.
28	L	19 9.40	1.957	13 37 25.97	127.63	15 33 27.7	662.3	65.76	15 17.8	56 2.5	
29	U	7 33.38	2.041	14 3 27.29	132.67	17 41 6.5	612.2	67.07	15 24.5	56 27.0	I. N.
29	L	19 58.42	2.133	14 30 31.94	138.16	19 37 29.8	549.6	68.47	15 31.6	56 53.1	
30	U	8 24.58	2.228	14 58 44.05	143.88	-21 20 2.4	-473.5	69.89	15 39.0	57 20.2	I. N.
30	L	20 51.88	2.322	15 28 4.89	149.56	22 45 57.6	383.3	71.28	15 46.5	57 47.9	
uly 1	U	9 20.29	2.410	15 58 32.11	154.88	23 52 24.3	278.9	72.55	15 54.1	58 15.7	I. N.
1	L	21 49.68	2.486	16 29 59.01	159.45	24 36 38.4	161.4	73.63	16 1.5	58 42.8	
2	U	10 19.89	2.544	17 2 14.45	162.91	-24 56 16.2	-33.3	74.43	16 8.5	59 8.5	I. N.S.

July 2, U Defective Illumination of N. O' M.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semid. ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
July 2	U	10 19.89	2.544	17 2 14.45	162.91	-24 56 16.2	-33.3	74.43	16 8.5	59 8.5	I. N.S.
2	L	22 50.65	2.578	17 35 3.31	164.98	24 49 30.5	+101.8	74.90	16 15.0	59 32.3	
3	U	11 21.67	2.587	18 8 7.83	165.51	24 15 24.3	239.2	75.01	16 20.7	59 53.3	I. N.S.
3	L	23 52.64	2.571	18 41 9.50	164.53	23 14 0.0	373.9	74.77	16 25.5	60 11.0	
4	U	12 23.28	2.533	19 13 51.20	162.23	-21 46 21.6	+500.8	74.22	16 29.3	60 24.9	II. N.S.
5	L	0 53.35	2.478	19 45 58.96	158.93	19 54 28.9	615.6	73.43	16 31.9	60 34.6	
5	U	13 22.70	2.413	20 17 23.08	155.02	17 41 7.8	715.2	72.50	16 33.4	60 40.0	II. N.
6	L	1 51.24	2.344	20 47 58.48	150.87	15 9 34.4	797.4	71.51	16 33.7	60 41.0	
6	U	14 18.96	2.276	21 17 44.29	146.81	-12 23 22.3	+861.6	70.53	16 32.8	60 37.8	II. N.
7	L	2 45.90	2.214	21 46 43.23	143.09	9 26 9.4	907.6	69.62	16 30.8	60 30.6	
7	U	15 12.14	2.161	22 15 0.56	139.89	6 21 29.3	936.2	68.84	16 27.9	60 19.8	II. N.
8	L	3 37.81	2.119	22 42 43.39	137.35	3 12 44.9	948.5	68.22	16 24.2	60 6.0	
8	U	16 3.05	2.089	23 9 59.87	135.51	-0 3 5.6	+945.6	67.77	16 19.7	59 49.6	II. N.
9	L	4 27.99	2.070	23 36 58.54	134.39	+3 4 34.2	928.8	67.50	16 14.7	59 31.2	
9	U	16 52.77	2.063	0 3 47.94	133.96	6 7 34.4	899.2	67.41	16 9.3	59 11.4	II. N.
10	L	5 17.54	2.067	0 30 36.17	134.18	9 3 27.5	857.8	67.47	16 3.6	58 50.6	
10	U	17 42.40	2.080	0 57 30.54	134.97	+11 49 58.0	+805.5	67.68	15 57.8	58 29.3	II. N.
11	L	6 7.47	2.100	1 24 37.26	136.22	14 24 59.4	743.1	68.01	15 52.0	58 7.9	
11	U	18 32.83	2.126	1 52 1.05	137.79	16 46 34.6	671.2	68.41	15 46.2	57 46.7	II. N.
12	L	6 58.52	2.155	2 19 44.94	139.54	18 52 55.5	590.8	68.83	15 40.5	57 25.9	
12	U	19 24.56	2.184	2 47 49.89	141.27	+20 42 24.5	+502.7	69.25	15 35.0	57 5.8	II. N.
13	L	7 50.93	2.210	3 16 14.58	142.80	22 13 35.8	408.1	69.61	15 29.8	56 46.5	
13	U	20 17.56	2.229	3 44 55.41	143.98	23 25 19.1	308.3	69.87	15 24.7	56 28.0	II. N.
14	L	8 44.37	2.238	4 13 46.64	144.50	24 16 42.8	205.2	69.98	15 20.0	56 10.5	
14	U	21 11.23	2.236	4 42 40.76	144.39	+24 47 17.5	+100.6	69.92	15 15.5	56 54.0	II. N.
15	L	9 37.99	2.222	5 11 29.11	143.54	24 56 58.0	-3.5	69.68	15 11.3	55 38.5	
15	U	22 4.51	2.196	5 40 2.71	141.96	24 46 3.7	104.9	69.24	15 7.3	55 23.9	II. S.
16	L	10 30.64	2.158	6 8 12.97	139.67	24 15 18.4	201.7	68.64	15 3.6	55 10.4	
16	U	22 56.25	2.111	6 35 52.50	136.84	+23 25 46.8	-292.3	67.89	15 0.2	54 57.9	II. S.
17	L	11 21.27	2.057	7 2 55.63	133.62	22 18 50.4	375.7	67.05	14 57.1	54 46.4	
17	U	23 45.61	2.000	7 29 18.63	130.18	20 56 2.9	450.9	66.13	14 54.2	54 36.0	
18	L	12 9.26	1.942	7 54 59.87	126.69	19 19 4.8	517.4	65.21	14 51.7	54 26.7	
19	U	0 32.22	1.885	8 19 59.61	123.29	+17 29 39.9	-575.3	64.30	14 49.5	54 18.6	
19	L	12 54.53	1.833	8 44 19.82	120.12	15 29 30.5	624.9	63.45	14 47.6	54 11.8	
20	U	1 16.23	1.786	9 8 3.84	117.28	13 20 16.1	666.2	62.70	14 46.2	54 6.4	I. N.
20	L	13 37.41	1.745	9 31 16.15	114.85	11 3 31.2	700.1	62.04	14 45.1	54 2.5	
21	U	1 58.14	1.712	9 54 2.02	112.88	+8 40 45.0	-726.5	61.52	14 44.5	54 0.2	I. N.
21	L	14 18.54	1.688	10 16 27.40	111.43	6 13 20.3	746.4	61.14	14 44.3	53 59.6	
22	U	2 38.70	1.673	10 38 38.70	110.54	3 42 36.2	759.9	60.92	14 44.7	54 0.9	I. N.
22	L	14 58.74	1.668	11 0 42.73	110.23	+1 9 46.7	767.4	60.86	14 45.6	54 4.2	
23	U	3 18.78	1.673	11 22 46.58	110.52	-1 23 55.4	-768.7	60.96	14 47.1	54 9.7	I. N.
23	L	15 38.94	1.688	11 44 57.58	111.43	3 57 19.3	764.2	61.25	14 49.2	54 17.4	
24	U	3 59.34	1.714	12 7 23.33	112.97	6 29 12.6	753.6	61.72	14 51.9	54 27.5	I. N.
24	L	16 20.11	1.750	12 30 11.50	115.17	8 58 19.2	736.4	62.36	14 55.3	54 40.0	
25	U	4 41.39	1.798	12 53 29.96	118.02	-11 23 17.3	-712.1	63.17	14 59.4	54 55.0	I. N.

July 2, U Defective Illumination of N. 0°.01.

July 3, U Defective Illumination of N. 0°.38.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" ' "	"	s	" "	" "	
July 25	U	4 41.39	1.798	12 53 29.96	118.02	-11 23 17.3	-712.1	63.17	14 59.4	54 55.0	I. N.
25	L	17 3.30	1.856	13 17 26.47	121.50	13 42 37.9	680.0	64.14	15 4.2	55 12.5	
26	U	5 25.97	1.924	13 42 8.57	125.61	15 54 41.2	639.0	65.26	15 9.6	55 32.5	I. N.
26	L	17 49.51	2.001	14 7 43.22	130.26	17 57 34.9	588.3	66.50	15 15.7	55 54.8	
27	U	6 14.03	2.086	14 34 16.39	135.34	-19 49 14.4	-526.5	67.82	15 22.4	56 19.3	I. N.
27	L	18 39.59	2.175	15 1 52.48	140.70	21 27 21.4	452.6	69.19	15 29.6	56 45.7	
28	U	7 6.23	2.265	15 30 33.56	146.13	22 49 27.0	366.2	70.54	15 37.2	57 13.7	I. N.
28	L	19 33.93	2.352	16 0 18.72	151.34	23 52 56.8	266.7	71.81	15 45.2	57 43.0	
29	U	8 2.63	2.429	16 31 3.44	156.01	-24 35 18.4	-154.9	72.92	15 53.3	58 12.9	I. N.
29	L	20 32.17	2.492	17 2 39.26	159.79	24 54 12.4	-32.5	73.81	16 1.5	58 42.9	
30	U	9 2.36	2.536	17 34 54.00	162.45	24 47 46.4	+97.9	74.41	16 9.5	59 12.3	I. N.S.
30	L	21 32.96	2.558	18 7 32.75	163.78	24 14 47.2	232.3	74.69	16 17.1	59 40.2	
31	U	10 3.67	2.558	18 40 19.17	163.73	-23 14 51.8	+366.4	74.65	16 24.1	60 5.9	I. N.S.
31	L	22 34.26	2.536	19 12 57.38	162.44	21 48 33.9	495.3	74.32	16 30.3	60 28.6	
Aug. 1	U	11 4.47	2.498	19 45 13.59	160.12	19 57 23.7	614.4	73.75	16 35.5	60 47.5	I. N.S.
1	L	23 34.15	2.447	20 16 57.39	157.09	17 43 41.3	720.1	73.00	16 39.4	61 2.0	
2	U	12 3.18	2.391	20 48 2.27	153.69	-15 10 27.5	+809.3	72.17	16 42.0	61 11.6	I. II. N.S.
3	L	0 31.52	2.333	21 18 25.78	150.24	12 21 11.4	880.2	71.32	16 43.2	61 16.0	
3	U	12 59.19	2.279	21 48 8.86	147.00	9 19 38.2	932.1	70.53	16 43.0	61 15.2	II. N.
4	L	1 26.25	2.232	22 17 15.25	144.16	6 9 38.9	964.7	69.84	16 41.4	61 9.2	
4	U	13 52.80	2.194	22 45 50.64	141.85	-2 55 0.6	+978.7	69.27	16 38.4	60 58.3	II. N.
5	L	2 18.95	2.166	23 14 1.92	140.15	+0 20 39.0	975.1	68.86	16 34.2	60 43.1	
5	U	14 44.82	2.148	23 41 56.58	139.07	3 33 55.7	955.1	68.62	16 29.1	60 24.2	II. N.
6	L	3 10.53	2.140	0 9 42.11	138.62	6 41 41.8	920.2	68.53	16 23.1	60 2.3	
6	U	15 36.21	2.142	0 37 25.54	138.71	+9 41 6.1	+871.7	68.58	16 16.5	59 38.0	II. N.
7	L	4 1.97	2.151	1 5 13.14	139.29	12 29 34.8	811.1	68.76	16 9.5	59 12.1	
7	U	16 27.87	2.167	1 33 9.90	140.22	15 4 50.6	739.8	69.02	16 2.2	58 45.3	II. N.
8	L	4 53.98	2.186	2 1 19.29	141.37	17 24 52.6	659.1	69.33	15 54.8	58 18.2	
8	U	17 20.33	2.206	2 29 43.00	142.58	+19 27 56.2	+570.3	69.64	15 47.4	57 51.3	II. N.
9	L	5 46.92	2.224	2 58 20.71	143.67	21 12 34.1	475.0	69.92	15 40.3	57 25.1	
9	U	18 13.70	2.238	3 27 10.02	144.49	22 37 36.8	374.7	70.12	15 33.4	56 59.9	II. N.
10	L	6 40.59	2.244	3 56 6.53	144.86	23 42 14.4	271.1	70.20	15 26.9	56 36.1	
10	U	19 7.51	2.241	4 25 4.25	144.66	+24 25 58.6	+166.1	70.14	15 20.9	56 13.8	II. N.
11	L	7 34.33	2.227	4 53 55.94	143.84	24 48 43.1	+61.5	69.91	15 15.3	55 53.2	
11	U	20 0.92	2.203	5 22 33.85	142.38	24 50 44.5	-40.8	69.50	15 10.1	55 34.3	II. N.
12	L	8 27.15	2.168	5 50 50.41	140.29	24 32 39.8	139.2	68.94	15 5.4	55 17.2	
12	U	20 52.91	2.125	6 18 38.78	137.70	+23 55 25.7	-232.2	68.25	15 1.3	55 1.9	II. S.
13	L	9 18.12	2.075	6 45 53.52	134.71	23 0 14.1	318.6	67.44	14 57.6	54 48.3	
13	U	21 42.70	2.021	7 12 30.78	131.47	21 48 28.7	397.7	66.56	14 54.3	54 36.4	II. S.
14	L	10 6.63	1.966	7 38 28.46	128.14	20 21 41.3	468.9	65.65	14 51.5	54 26.1	
14	U	22 29.89	1.911	8 3 46.24	124.84	+18 41 27.8	-532.1	64.74	14 49.1	54 17.4	II. S.
15	L	10 52.50	1.859	8 28 25.34	121.71	16 49 25.6	587.0	63.88	14 47.2	54 10.2	
15	U	23 14.52	1.811	8 52 28.28	118.83	14 47 10.5	634.2	63.08	14 45.6	54 4.4	
16	L	11 36.00	1.769	9 15 58.70	116.30	12 36 16.5	673.6	62.37	14 44.4	54 0.0	
16	U	23 57.01	1.734	9 39 1.08	114.18	+10 18 13.8	-705.7	61.77	14 43.6	53 57.1	

July 31, U Defective Illumination of N. 1'.00.  
 Aug. 1, U Defective Illumination of N. 0'.56.

Aug. 2, U Defective Illumination of N. 0'.50.  
 Aug. 2, U Defective Illumination of S. 0'.20.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" "	" "	s	" "	" "	
Aug. 16	U	23 57.01	1.734	9 39 1.08	114.18	+10 18 13.8	-705.7	61.77	14 43.6	53 57.1	
17	L	12 17.64	1.706	10 1 40.57	112.49	7 54 29.0	730.7	61.30	14 43.2	53 55.6	
18	U	0 37.98	1.686	10 24 2.77	111.29	5 26 25.5	748.8	60.97	14 43.2	53 55.5	
18	L	12 58.14	1.675	10 46 13.63	110.61	2 55 22.9	760.4	60.79	14 43.6	53 56.9	
19	U	1 18.21	1.672	11 8 19.45	110.45	+ 0 22 39.2	-765.7	60.77	14 44.4	53 59.8	I. N.
19	L	13 38.30	1.678	11 30 26.67	110.84	- 2 10 29.2	764.6	60.90	14 45.6	54 4.3	
20	U	1 58.53	1.694	11 52 41.92	111.80	4 42 45.7	757.0	61.20	14 47.3	54 10.5	I. N.
20	L	14 19.00	1.719	12 15 11.98	113.31	7 12 52.4	742.9	61.65	14 49.5	54 18.5	
21	U	2 39.84	1.754	12 38 3.65	115.40	- 9 39 28.8	-721.9	62.26	14 52.2	54 28.4	I. N.
21	L	15 1.14	1.798	13 1 23.74	118.05	12 1 10.8	693.7	63.03	14 55.4	54 40.2	
22	U	3 23.03	1.851	13 25 18.92	121.24	14 16 27.3	657.7	63.93	14 59.1	54 54.0	I. N.
22	L	15 45.61	1.913	13 49 55.51	124.94	16 23 40.7	613.1	64.96	15 3.5	55 9.9	
23	U	4 8.97	1.982	14 15 19.18	129.08	-18 21 5.0	-559.3	66.09	15 8.4	55 28.0	I. N.
23	L	16 33.19	2.056	14 41 34.71	133.56	20 6 45.4	495.6	67.29	15 13.9	55 48.2	
24	U	4 58.32	2.134	15 8 45.32	138.23	21 38 39.1	421.5	68.51	15 19.9	56 10.4	I. N.
24	L	17 24.40	2.212	15 36 52.40	142.94	22 54 37.4	336.4	69.72	15 26.5	56 34.6	
25	U	5 51.40	2.287	16 5 54.89	147.43	-23 52 29.4	-240.4	70.85	15 33.6	57 0.5	I. N.
25	L	18 19.25	2.354	16 35 48.86	151.47	24 30 7.4	134.2	71.85	15 41.1	57 28.0	
26	U	6 47.84	2.409	17 6 27.42	154.82	24 45 35.6	- 19.2	72.66	15 48.9	57 56.6	I. N.
26	L	19 17.02	2.450	17 37 41.01	157.27	24 37 19.7	+102.7	73.24	15 56.9	58 25.8	
27	U	7 46.58	2.474	18 9 17.98	158.70	-24 4 14.4	+228.5	73.55	16 4.8	58 55.1	I. N.S.
27	L	20 16.32	2.480	18 41 5.66	159.07	23 5 53.3	354.8	73.60	16 12.6	59 23.8	
28	U	8 46.04	2.470	19 12 51.64	158.44	21 42 32.7	477.8	73.42	16 20.1	59 51.2	I. S.
28	L	21 15.54	2.446	19 44 24.97	156.99	19 55 15.2	593.7	73.04	16 27.0	60 16.6	
29	U	9 44.69	2.412	20 15 37.18	154.96	-17 45 45.8	+699.2	72.51	16 33.1	60 39.0	I. S.
29	L	22 13.40	2.373	20 46 22.76	152.61	15 16 29.0	791.1	71.91	16 38.2	60 57.7	
30	U	10 41.63	2.332	21 16 39.34	150.17	12 30 21.0	867.3	71.28	16 42.1	61 12.0	I. S.
30	L	23 9.38	2.294	21 46 27.40	147.88	9 30 42.2	926.0	70.70	16 44.7	61 21.4	
31	U	11 36.71	2.262	22 15 49.78	145.92	- 6 21 8.9	+966.3	70.20	16 45.8	61 25.5	I. N.S.
Sept. 1	L	0 3.69	2.236	22 44 51.16	144.39	- 3 5 26.7	987.5	69.82	16 45.4	61 24.2	
1	U	12 30.41	2.219	23 13 37.26	143.38	+ 0 12 37.0	990.0	69.57	16 43.6	61 17.3	II. N.
2	L	0 56.99	2.211	23 42 14.46	142.91	3 29 19.0	974.0	69.46	16 40.3	61 5.3	
2	U	13 23.52	2.212	0 10 49.05	142.95	+ 6 41 5.4	+940.8	69.49	16 35.7	60 48.5	II. N.
3	L	1 50.11	2.220	0 39 26.86	143.43	9 44 35.3	891.6	69.63	16 30.0	60 27.6	
3	U	14 16.83	2.234	1 8 12.69	144.26	12 36 44.5	827.7	69.87	16 23.4	60 3.3	II. N.
4	L	2 43.74	2.251	1 37 9.98	145.31	15 14 48.4	750.9	70.17	16 16.1	59 36.4	
4	U	15 10.86	2.270	2 6 20.43	146.42	+17 36 24.3	+663.3	70.48	16 8.3	59 7.7	II. N.
5	L	3 38.21	2.287	2 35 43.71	147.43	19 39 32.9	566.8	70.76	16 0.2	58 38.0	
5	U	16 5.72	2.298	3 5 17.38	148.13	21 22 40.6	463.6	70.96	15 52.0	58 8.0	II. N.
6	L	4 33.33	2.302	3 34 56.99	148.38	22 44 40.6	355.9	71.04	15 43.9	57 38.3	
6	U	17 0.94	2.297	4 4 36.30	148.06	+23 44 54.0	+246.1	70.98	15 36.1	57 9.6	II. N.
7	L	5 28.42	2.281	4 34 7.85	147.09	24 23 9.5	136.6	70.75	15 28.6	56 42.2	
7	U	17 55.64	2.254	5 3 23.71	145.44	24 39 42.3	+ 20.4	70.31	15 21.6	56 16.5	II. N.
8	L	6 22.47	2.216	5 32 16.01	143.18	24 35 11.3	- 73.7	69.77	15 15.2	55 52.8	
8	U	18 48.79	2.169	6 0 37.79	140.38	+24 10 36.5	-171.1	69.04	15 9.3	55 31.3	II. S.

Aug. 27, U Defective Illumination of N. 0° 29.

Aug. 31, U Defective Illumination of S. 0° 22.



## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Me- ridian.	Geocen- tric Semidi- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	" ' "	"	s	" "	" "	
pt. 8	U	18 48.79	2.169	6 037.79	140.38	+24 10 36.5	-171.1	69.04	15 9.3	55 31.3	II. S.
9	L	7 14.51	2.116	6 28 23.47	137.18	23 27 12.8	261.7	68.20	15 4.0	55 12.0	
9	U	19 39.56	2.059	6 55 29.20	133.74	22 26 26.5	344.7	67.28	14 59.4	54 55.0	II. S.
10	L	8 3.92	2.001	7 21 52.96	130.22	21 9 50.9	419.9	66.33	14 55.4	54 40.4	
10	U	20 27.58	1.943	7 47 34.51	126.73	+19 39 2.0	-486.9	65.37	14 52.1	54 28.1	II. S.
11	L	8 50.55	1.888	8 12 35.17	123.42	17 55 35.8	546.1	64.45	14 49.3	54 18.0	
11	U	21 12.89	1.837	8 36 57.62	120.38	16 1 6.1	597.5	63.59	14 47.1	54 10.0	II. S.
12	L	9 34.66	1.792	9 0 45.59	117.68	13 57 3.9	641.6	62.81	14 45.5	54 3.9	
12	U	21 55.93	1.754	9 24 3.60	115.39	+11 44 56.6	-678.4	62.15	14 44.4	53 59.8	II. S.
13	L	10 16.79	1.794	9 46 56.80	113.55	9 26 8.3	708.5	61.60	14 43.7	53 57.5	
13	U	22 37.33	1.701	10 9 30.72	112.18	7 2 0.1	731.9	61.19	14 43.5	53 56.8	II. S.
14	L	10 57.65	1.686	10 31 51.21	111.31	4 33 51.2	748.6	60.92	14 43.8	53 57.7	
14	U	23 17.84	1.680	10 54 4.29	110.96	+ 2 2 59.3	-759.0	60.81	14 44.4	54 0.0	
15	L	11 38.01	1.683	11 16 16.18	111.12	- 0 29 17.5	762.8	60.85	14 45.4	54 3.7	
15	U	23 58.26	1.694	11 38 33.09	111.79	3 1 40.9	759.9	61.04	14 46.8	54 8.8	
16	L	12 18.71	1.714	12 1 1.31	113.00	5 32 50.3	750.4	61.39	14 48.6	54 15.2	
17	U	0 39.44	1.743	12 23 47.07	114.72	- 8 1 22.4	-733.7	61.88	14 50.7	54 22.9	
17	L	13 0.57	1.780	12 46 56.50	116.94	10 25 49.7	709.5	62.51	14 53.1	54 31.8	
18	U	1 22.19	1.825	13 10 35.57	119.65	12 44 40.2	677.4	63.27	14 55.9	54 42.1	I. N.
18	L	13 44.39	1.877	13 34 49.78	122.79	14 56 16.8	637.1	64.14	14 59.0	54 53.7	
19	U	2 7.26	1.936	13 59 44.06	126.32	-16 58 56.4	-587.9	65.12	15 2.6	55 6.7	I. N.
19	L	14 30.87	1.999	14 25 22.50	130.14	18 50 50.8	529.5	66.16	15 6.5	55 21.1	
20	U	2 55.26	2.066	14 51 47.95	134.13	20 30 6.8	461.5	67.24	15 10.8	55 37.0	I. N.
20	L	15 20.45	2.133	15 19 1.73	138.16	21 54 48.4	383.8	68.32	15 15.6	55 54.4	
21	U	3 46.43	2.197	15 47 3.20	142.05	-23 3 0.1	-296.6	69.34	15 20.7	56 13.2	I. N.
21	L	16 13.16	2.256	16 15 49.59	145.61	23 52 50.6	200.4	70.26	15 26.2	56 33.5	
22	U	4 40.55	2.307	16 45 15.79	148.06	24 22 38.3	- 96.3	71.04	15 32.1	56 55.2	I. N.
22	L	17 8.48	2.346	17 15 14.56	151.02	24 30 56.8	+ 14.2	71.64	15 38.4	57 18.1	
23	U	5 36.80	2.372	17 45 37.00	152.59	-24 16 42.2	+128.9	72.03	15 44.9	57 42.1	I. N.
23	L	18 5.36	2.384	18 16 13.21	153.31	23 39 17.2	245.4	72.21	15 51.7	58 6.8	
24	U	6 33.97	2.383	18 46 53.19	153.22	22 38 35.5	361.1	72.18	15 58.5	58 31.9	I. S.
24	L	19 2.50	2.370	19 17 27.83	152.44	21 15 4.2	473.3	71.97	16 5.3	58 57.0	
25	U	7 30.82	2.348	19 47 49.67	151.13	-19 29 41.8	+579.1	71.63	16 12.0	59 21.6	I. S.
25	L	19 58.83	2.321	20 17 53.46	149.47	17 23 59.1	676.3	71.19	16 18.4	59 45.0	
26	U	8 26.50	2.291	20 47 36.47	147.70	14 59 54.3	762.5	70.72	16 24.3	60 6.6	I. S.
26	L	20 53.82	2.263	21 16 58.40	145.99	12 19 49.7	835.9	70.26	16 29.5	60 25.7	
27	U	9 20.82	2.238	21 46 1.14	144.52	- 9 26 28.7	+895.0	69.87	16 33.9	60 41.7	I. S.
27	L	21 47.57	2.220	22 14 48.45	143.44	6 22 51.9	938.4	69.56	16 37.2	60 53.9	
28	U	10 14.14	2.210	22 43 25.40	142.81	- 3 12 13.8	965.0	69.38	16 39.4	61 1.8	I. S.
28	L	22 40.64	2.208	23 11 57.91	142.70	+ 0 2 0.9	974.3	69.32	16 40.2	61 5.0	
29	U	11 7.16	2.215	23 40 32.23	143.11	+ 3 16 20.9	+965.9	69.41	16 39.8	61 3.3	I. N.S.
29	L	23 33.82	2.200	0 9 14.47	144.01	6 27 12.2	939.6	69.63	16 37.9	60 56.6	
30	U	12 0.70	2.252	0 38 10.06	145.32	9 31 4.2	896.1	69.96	16 34.8	60 45.0	I. II. N.
ct. 1	L	0 27.88	2.278	1 7 23.27	146.92	12 24 33.2	836.0	70.37	16 30.4	60 29.0	
1	U	12 55.39	2.307	1 36 56.62	148.65	+15 4 28.5	+760.8	70.81	16 24.9	60 8.9	II. N.

Sept. 30, U Defective Illumination of I. &amp; S.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi-d. Pass- ing Mer- idian.	Geocen- tric Semi-d. ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Oct. 1	U	12 55.39	2.307	1 36 56.62	148.65	+15 4 28.5	+780.8	70.81	16 24.9	60 8.9	II. N.
2	L	1 23.24	2.335	2 6 50.57	180.31	17 27 58.9	672.2	71.24	16 18.5	59 45.4	
2	U	13 51.40	2.358	2 37 3.14	151.71	19 32 37.3	572.6	71.61	16 11.4	59 19.3	II. N.
3	L	2 19.80	2.373	3 7 29.78	182.63	21 16 26.5	464.5	71.87	16 3.8	58 51.2	
3	U	14 48.31	2.377	3 38 3.62	182.89	+22 38 3.8	+360.9	71.97	15 55.8	58 21.9	II. N.
4	L	3 16.80	2.368	4 8 35.89	182.35	23 36 40.8	235.1	71.87	15 47.7	57 52.3	
4	U	15 45.10	2.345	4 38 56.67	180.97	24 12 9.2	120.0	71.56	15 39.7	57 22.9	II. N.
5	L	4 13.04	2.309	5 8 55.93	148.78	24 24 52.9	+ 8.2	71.04	15 31.9	56 54.4	
5	U	16 40.47	2.261	5 38 24.35	145.86	+24 15 46.5	- 98.1	70.34	15 24.5	56 27.3	II. N. S.
6	L	5 7.25	2.203	6 7 14.25	142.38	23 46 8.3	197.0	69.48	15 17.6	56 1.9	
6	U	17 33.30	2.139	6 35 19.95	138.53	22 57 32.9	287.5	68.52	15 11.3	55 38.7	II. S.
7	L	5 58.57	2.072	7 2 38.20	134.50	21 51 44.6	369.0	67.48	15 5.6	55 17.8	
7	U	18 23.03	2.005	7 29 7.95	130.46	+20 30 31.5	-441.6	66.43	15 0.6	54 59.4	II. S.
8	L	6 46.69	1.941	7 54 50.22	126.61	18 55 40.4	505.4	65.39	14 56.3	54 43.7	
8	U	19 9.62	1.881	8 19 47.74	123.03	17 8 53.7	580.9	64.41	14 52.7	54 30.5	II. S.
9	L	7 31.87	1.828	8 44 4.56	119.84	15 11 48.3	608.6	63.52	14 49.9	54 20.0	
9	U	19 53.52	1.782	9 7 45.69	117.10	+13 5 54.7	-649.0	62.74	14 47.7	54 12.1	II. S.
10	L	8 14.68	1.745	9 30 56.81	114.84	10 52 36.9	682.7	62.08	14 46.2	54 6.7	
10	U	20 35.44	1.716	9 53 44.08	113.12	8 33 14.4	710.0	61.57	14 45.4	54 3.6	II. S.
11	L	8 55.91	1.697	10 16 13.91	111.94	6 9 2.4	731.0	61.20	14 45.2	54 2.8	
11	U	21 16.20	1.686	10 38 32.89	111.31	+ 3 41 14.6	-746.0	60.98	14 45.5	54 4.0	II. S.
12	L	9 36.42	1.685	11 0 47.66	111.24	+ 1 11 3.5	754.8	60.93	14 46.4	54 7.2	
12	U	21 56.68	1.663	11 23 4.92	111.73	- 1 20 16.9	757.5	61.03	14 47.7	54 12.2	II. S.
13	L	10 17.09	1.710	11 45 31.25	112.76	3 51 30.2	753.7	61.30	14 49.5	54 18.7	
13	U	22 37.76	1.776	12 8 13.24	114.33	- 6 21 16.1	-742.8	61.71	14 51.7	54 26.7	II. S.
14	L	10 58.80	1.731	12 31 17.25	116.42	8 48 8.7	724.6	62.27	14 54.2	54 35.9	
14	U	23 20.30	1.814	12 54 49.35	119.01	11 10 35.9	698.4	62.97	14 57.0	54 46.2	
15	L	11 42.37	1.865	13 18 55.19	122.04	13 26 58.7	663.9	63.79	15 0.1	54 57.5	
16	U	0 5.08	1.921	13 43 39.76	125.45	-15 35 31.5	-620.1	64.71	15 3.4	55 9.7	
16	L	12 28.50	1.983	14 9 7.14	129.15	17 34 21.7	566.7	65.69	15 6.9	55 22.7	
17	U	0 52.68	2.047	14 35 20.09	133.02	19 21 32.0	503.4	66.72	15 10.6	55 36.3	I. N.
17	L	13 17.63	2.112	15 2 19.82	136.92	20 55 2.5	430.1	67.75	15 14.5	55 50.5	
18	U	1 43.35	2.174	15 30 5.47	140.66	-22 12 53.7	-346.9	68.74	15 18.6	56 5.3	I. N.
18	L	14 9.79	2.230	15 58 34.04	144.04	23 13 12.2	254.7	69.62	15 22.8	56 20.7	
19	U	2 36.84	2.278	16 27 40.20	146.89	23 54 16.1	154.7	70.36	15 27.1	56 36.7	I. N.
19	L	15 4.40	2.314	16 57 16.48	149.04	24 14 40.5	- 48.5	70.93	15 31.6	56 53.1	
20	U	3 32.31	2.336	17 27 13.76	150.37	-24 13 23.7	+ 61.8	71.30	15 36.2	57 10.1	I. N.
20	L	16 0.40	2.344	17 57 22.03	150.86	23 49 51.3	173.7	71.45	15 40.9	57 27.4	
21	U	4 28.50	2.338	18 27 31.19	150.53	23 3 58.7	284.7	71.39	15 45.8	57 45.2	I. S.
21	L	16 56.47	2.321	18 57 32.09	149.51	21 56 11.4	392.4	71.16	15 50.7	58 3.2	
22	U	5 24.18	2.295	19 27 17.31	147.95	-20 27 23.7	+494.4	70.79	15 55.6	58 21.3	I. S.
22	L	17 51.54	2.264	19 56 41.65	146.06	18 38 54.2	589.1	70.32	16 0.5	58 39.3	
23	U	6 18.50	2.230	20 25 42.40	144.05	16 32 22.9	674.6	69.82	16 5.3	58 57.0	I. S.
23	L	18 45.07	2.198	20 54 19.35	142.13	14 9 47.4	749.6	69.32	16 9.9	59 13.9	
24	U	7 11.28	2.171	21 22 34.56	140.46	-11 33 18.3	+813.2	68.88	16 14.3	59 29.8	I. S.

Oct. 5, U Defective Illumination of S. O' 66.

## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Meri- dian.	Geocen- tric Semi- diameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Oct. 24	U	7 11.28	2.171	21 22 34.56	140.46	-11 33 18.3	+813.2	68.88	16 14.3	59 29.8	I. S.
24	L	19 37.20	2.180	21 50 31.96	189.18	8 45 18.3	864.6	68.53	16 18.2	59 44.2	
25	U	8 2.91	2.137	22 18 16.95	138.41	5 48 19.9	902.8	68.30	16 21.6	59 56.7	I. S.
25	L	20 28.52	2.133	22 45 55.98	138.20	- 2 45 5.3	927.2	68.22	16 24.4	60 6.8	
26	U	8 54.14	2.140	23 13 36.08	138.59	+ 0 21 34.7	+936.9	68.29	16 26.4	60 14.1	I. S.
26	L	21 19.91	2.156	23 41 24.50	139.58	3 28 40.5	931.4	68.51	16 27.5	60 18.2	
27	U	9 45.93	2.182	0 9 28.21	141.13	6 33 6.1	910.1	68.87	16 27.6	60 18.8	I. S.
27	L	22 12.30	2.216	0 37 53.42	143.15	9 31 39.9	872.8	69.36	16 26.8	60 15.6	
28	U	10 39.12	2.255	1 6 45.14	145.51	+12 21 8.8	+819.3	69.93	16 24.9	60 8.6	I. N.S.
28	L	23 6.43	2.297	1 36 6.50	148.05	14 58 22.2	750.3	70.55	16 21.9	59 57.8	
29	U	11 34.25	2.338	2 5 58.31	150.55	17 20 18.8	666.8	71.16	16 18.0	59 43.3	I. II. N.
30	L	0 2.54	2.375	2 36 18.63	152.76	19 24 14.2	570.4	71.70	16 13.1	59 25.5	
30	U	12 31.22	2.403	3 7 2.39	154.42	+21 7 48.4	+463.8	72.12	16 7.5	59 4.9	II. N.
31	L	1 0.15	2.417	3 38 1.58	155.30	22 29 13.8	349.5	72.34	16 1.2	58 41.9	
31	U	13 29.17	2.416	4 9 5.76	155.23	23 27 21.2	281.3	72.35	15 54.5	58 17.1	II. N.
Nov. 1	L	1 58.07	2.398	4 40 2.87	154.12	24 1 43.8	+112.7	72.11	15 47.4	57 51.2	
1	U	14 26.65	2.362	5 10 40.45	151.98	+24 12 36.8	- 3.1	71.63	15 40.2	57 24.8	II. N.
2	L	2 54.71	2.312	5 40 46.83	148.94	24 0 53.1	113.1	70.92	15 33.1	56 58.5	
2	U	15 22.09	2.249	6 10 12.28	145.20	23 27 56.5	214.9	70.02	15 26.1	56 32.9	II. N.S.
3	L	3 48.67	2.179	6 38 49.62	140.97	22 35 32.7	307.4	68.99	15 19.4	56 8.5	
3	U	16 14.37	2.105	7 6 34.65	136.52	+21 25 39.7	-389.7	67.88	15 13.2	55 45.7	II. S.
4	L	4 39.19	2.031	7 33 25.93	132.06	20 0 20.3	461.8	66.75	15 7.5	55 24.9	
4	U	17 3.13	1.960	7 59 24.52	127.77	18 21 35.1	524.1	65.64	15 2.5	55 6.3	II. S.
5	L	5 26.24	1.864	8 24 33.55	123.81	16 31 18.4	577.2	64.60	14 58.1	54 50.1	
5	U	17 48.61	1.836	8 48 57.69	120.29	+14 31 15.4	-621.9	63.65	14 54.4	54 36.6	II. S.
6	L	6 10.33	1.786	9 12 42.69	117.29	12 23 2.6	669.0	62.83	14 51.5	54 25.9	
6	U	18 31.51	1.745	9 35 55.06	114.86	10 8 7.0	689.1	62.15	14 49.3	54 17.9	II. S.
7	L	6 52.26	1.715	9 58 41.77	113.02	7 47 48.0	713.0	61.61	14 47.8	54 12.6	
7	U	19 12.71	1.694	10 21 10.06	111.80	+ 5 23 18.8	-730.9	61.25	14 47.2	54 10.2	II. S.
8	L	7 32.97	1.684	10 43 27.32	111.19	2 55 49.1	743.1	61.06	14 47.3	54 10.4	
8	U	19 53.17	1.684	11 5 40.97	111.20	+ 0 26 26.3	749.7	61.03	14 48.0	54 13.1	II. S.
9	L	8 13.43	1.695	11 27 58.46	111.82	- 2 3 41.3	750.6	61.17	14 49.4	54 18.2	
9	U	20 33.88	1.716	11 50 27.17	113.06	- 4 33 23.0	-745.3	61.48	14 51.4	54 25.5	II. S.
10	L	8 54.64	1.746	12 13 14.35	114.90	7 12 2.8	733.6	61.96	14 53.9	54 34.9	
10	U	21 15.82	1.786	12 36 27.09	117.32	9 26 18.4	714.5	62.60	14 57.0	54 46.1	II. S.
11	L	9 37.54	1.835	13 0 12.13	120.27	11 46 39.4	687.5	63.37	15 0.4	54 58.9	
11	U	21 59.90	1.892	13 24 35.64	123.72	-14 0 45.3	-661.9	64.27	15 4.3	55 12.9	II. S.
12	L	10 22.99	1.967	13 49 43.03	127.58	16 6 46.3	606.5	65.27	15 8.4	55 28.0	
12	U	22 46.88	2.026	14 15 38.50	131.73	18 2 43.0	551.0	66.34	15 12.7	55 43.9	
13	L	11 11.61	2.097	14 42 24.71	135.00	19 46 28.2	484.7	67.43	15 17.2	56 0.2	
13	U	23 37.19	2.167	15 10 2.14	140.22	-21 15 51.2	-407.4	68.50	15 21.7	56 16.8	
14	L	12 3.60	2.233	15 38 28.92	144.17	22 28 41.8	319.3	69.50	15 26.2	56 33.3	
15	U	0 30.74	2.290	16 7 40.32	147.62	23 22 57.7	221.7	70.36	15 30.6	56 49.7	
15	L	12 58.50	2.335	16 37 28.81	150.33	23 56 52.1	116.1	71.05	15 35.0	57 5.6	
16	U	1 26.71	2.365	17 7 44.55	152.13	-24 9 2.2	- 4.9	71.52	15 39.2	57 20.3	I. N.

Oct. 28, U Defective Illumination of N. 0° 35.  
Oct. 29, U Defective Illumination of II. 0° 04.

Nov. 2, U Defective Illumination of N. 0° 38.



## FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Pass- ing Mer- idian.	Geocen- tric Semidim- eter.	Equa- torial Horiz- ontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Nov. 16	U	1 26.71	2.365	17 7 44.55	152.13	-24 9 2.2	- 4.9	71.52	15 39.2	57 20.9	I. N.
16	L	13 55.19	2.378	17 38 15.87	152.92	23 58 36.1	+109.4	71.74	15 43.2	57 35.6	
17	U	2 23.72	2.374	18 8 50.55	152.70	23 25 17.1	223.5	71.72	15 47.0	57 49.6	I. S.
17	L	14 52.11	2.355	18 39 16.86	151.55	22 29 25.1	334.5	71.47	15 50.6	58 2.7	
18	U	3 20.19	2.324	19 9 24.74	149.66	-21 11 55.1	+439.4	71.04	15 53.9	58 14.9	I. S.
18	L	15 47.84	2.284	19 39 6.60	147.26	19 34 11.8	536.3	70.48	15 57.0	58 26.4	
19	U	4 14.98	2.239	20 8 17.76	144.58	17 38 3.4	623.3	69.84	15 59.9	58 37.0	I. S.
19	L	16 41.58	2.194	20 36 56.51	141.89	15 25 34.8	699.5	69.19	16 2.5	58 46.7	
20	U	5 7.66	2.153	21 5 3.90	139.38	-12 59 1.9	+764.0	68.57	16 4.9	58 55.5	I. S.
20	L	17 33.28	2.118	21 32 43.35	137.25	10 20 46.7	816.5	68.04	16 7.1	59 3.5	
21	U	5 58.52	2.091	22 0 0.06	135.62	7 33 14.3	856.8	67.62	16 9.0	59 10.4	I. S.
21	L	18 23.49	2.073	22 27 0.63	134.59	4 38 52.0	884.9	67.35	16 10.6	59 16.2	
22	U	6 48.31	2.067	22 53 52.60	134.19	- 140 8.8	+900.3	67.23	16 11.8	59 20.8	I. S.
22	L	19 13.13	2.072	23 20 43.91	134.48	+ 120 24.9	903.1	67.29	16 12.7	59 24.1	
23	U	7 38.07	2.087	23 47 42.69	135.43	4 20 14.4	892.9	67.52	16 13.2	59 25.7	I. S.
23	L	20 3.26	2.113	0 14 56.79	137.01	7 16 41.7	869.3	67.89	16 13.1	59 25.5	
24	U	8 28.83	2.149	0 42 33.32	139.16	+10 7 4.9	+832.2	68.40	16 12.5	59 23.3	I. S.
24	L	20 54.87	2.192	1 10 38.25	141.74	12 48 38.6	781.1	69.02	16 11.3	59 19.0	
25	U	9 21.45	2.239	1 39 15.89	144.58	15 18 35.9	716.2	69.71	16 9.6	59 12.5	I. S.
25	L	21 48.61	2.287	2 8 28.27	147.48	17 34 13.2	637.9	70.40	16 7.1	59 3.6	
26	U	10 16.34	2.333	2 38 14.70	150.20	+19 32 55.0	+547.1	71.05	16 4.1	58 52.3	I. S.
26	L	22 44.57	2.370	3 8 31.38	152.48	21 12 22.0	445.7	71.59	16 0.4	58 38.8	
27	U	11 13.19	2.396	3 39 11.24	154.03	22 30 38.9	335.9	71.95	15 56.1	58 23.1	I. N.S.
27	L	23 42.02	2.407	4 10 4.34	154.65	23 26 22.9	220.7	72.09	15 51.3	58 5.5	
28	U	12 10.87	2.399	4 40 58.57	154.20	+23 58 49.5	+103.6	71.99	15 46.1	57 46.4	II. N.S.
29	L	0 39.53	2.373	5 11 40.78	152.65	24 7 55.8	- 12.0	71.62	15 40.6	57 26.0	
29	U	13 7.77	2.331	5 41 58.08	150.07	23 54 19.5	123.0	71.01	15 34.8	57 4.9	II. N.S.
30	L	1 35.40	2.274	6 11 39.09	146.64	23 19 13.3	226.5	70.18	15 28.9	56 43.4	
30	U	14 2.29	2.206	6 40 34.94	142.59	+22 24 18.5	-320.9	69.20	15 23.1	56 22.0	II. N.S.
Dec. 1	L	2 28.33	2.133	7 8 39.71	138.17	21 11 33.6	404.8	68.11	15 17.4	56 1.2	
1	U	14 53.47	2.057	7 35 50.49	133.63	19 43 6.7	477.9	66.98	15 12.0	55 41.3	II. S.
2	L	3 17.71	1.984	8 2 7.30	129.20	18 1 6.7	540.4	65.87	15 7.0	55 22.7	
2	U	15 41.09	1.915	8 27 32.43	126.05	+16 7 37.3	-592.8	64.80	15 2.4	55 5.8	II. S.
3	L	4 3.69	1.852	8 52 10.04	121.30	14 4 34.7	636.1	63.82	14 58.3	54 50.9	
3	U	16 25.58	1.798	9 16 5.65	118.06	11 53 43.9	671.1	62.96	14 54.8	54 38.2	II. S.
4	L	4 46.89	1.754	9 39 25.74	115.38	9 36 40.0	698.4	62.25	14 52.0	54 27.9	
4	U	17 7.72	1.720	10 2 17.34	113.32	+ 7 14 47.8	-719.1	61.69	14 49.9	54 20.2	II. S.
5	L	5 28.20	1.696	10 24 47.86	111.87	4 49 24.3	733.7	61.30	14 48.6	54 15.3	
5	U	17 48.46	1.683	10 47 4.97	111.08	+ 2 21 40.1	742.7	61.08	14 48.0	54 13.1	II. S.
6	L	6 8.62	1.680	11 9 16.49	110.95	- 0 7 18.2	746.1	61.04	14 48.2	54 13.8	
6	U	18 28.83	1.689	11 31 30.22	111.45	- 2 36 25.6	-744.1	61.17	14 49.1	54 17.2	II. S.
7	L	6 49.20	1.708	11 53 54.02	112.62	5 4 35.7	736.6	61.49	14 50.8	54 23.5	
7	U	19 9.86	1.738	12 16 35.72	114.44	7 30 39.2	723.0	61.97	14 53.2	54 32.4	II. S.
8	L	7 30.96	1.779	12 39 43.04	116.89	9 53 20.7	702.7	62.62	14 56.3	54 43.8	
8	U	19 52.60	1.830	13 3 23.41	119.94	-12 11 16.3	-675.2	63.44	15 0.1	54 57.5	II. S.

Nov. 27, U Defective Illumination of S. 0°.04.  
Nov. 28, U Defective Illumination of S. 0°.56.

Nov. 29, U Defective Illumination of S. 0°.05.  
Nov. 30, U Defective Illumination of N. 1°.32.

## MOON-CULMINATIONS, 1917.

537

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semi-d. Pass- ing Meri- dian.	Geocen- tric Semi-di- ameter.	Equa- torial Hori- zontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ' "	"	s	' "	' "	
Dec. 8	U	19 52.60	1.830	13 3 23.41	119.94	-12 11 16.3	-675.2	63.44	15 0.1	54 57.5	II. S.
9	L	8 14.91	1.890	13 27 43.89	123.56	14 22 52.8	639.4	64.38	15 4.4	55 13.4	
9	U	20 37.99	1.958	13 52 50.81	127.67	16 26 24.9	594.3	65.44	15 9.2	55 31.1	II. S.
10	L	9 1.93	2.033	14 18 49.38	132.15	18 19 55.9	539.0	66.58	15 14.5	55 50.3	
10	U	21 26.79	2.111	14 45 43.24	136.85	-20 1 18.1	-472.8	67.76	15 20.0	56 10.7	II. S.
11	L	9 52.59	2.189	15 13 33.83	141.57	21 28 16.1	395.0	68.93	15 25.8	56 31.9	
11	U	22 19.31	2.264	15 42 19.89	146.05	22 38 30.9	305.6	70.02	15 31.6	56 53.3	II. S.
12	L	10 46.88	2.330	16 11 57.02	150.02	23 29 48.7	205.6	70.99	15 37.5	57 14.7	
12	U	23 15.17	2.383	16 42 17.49	153.23	-24 0 8.8	-96.4	71.75	15 43.1	57 35.5	
13	L	11 44.01	2.419	17 13 10.55	155.43	24 7 55.4	+ 19.5	72.28	15 48.5	57 55.3	
14	U	0 13.17	2.437	17 44 23.14	156.47	23 52 6.0	139.0	72.53	15 53.5	58 13.7	
14	L	12 42.42	2.435	18 15 41.18	156.34	23 12 19.7	258.4	72.51	15 58.1	58 30.3	
15	U	1 11.53	2.414	18 46 50.89	155.11	-22 9 0.0	+374.0	72.23	16 2.1	58 44.9	I. S.
15	L	13 40.30	2.379	19 17 40.25	152.99	20 43 13.2	482.4	71.74	16 5.5	58 57.4	
16	U	2 8.58	2.333	19 48 0.04	150.23	18 56 42.8	580.8	71.09	16 8.2	59 7.5	I. S.
16	L	14 36.27	2.282	20 17 44.34	147.12	16 51 41.8	667.2	70.35	16 10.3	59 15.2	
17	U	3 3.33	2.229	20 46 50.66	143.93	-14 30 42.3	+740.4	69.59	16 11.8	59 20.6	I. S.
17	L	15 29.77	2.179	21 15 19.70	140.94	11 56 27.9	799.6	68.88	16 12.7	59 23.8	
18	U	3 55.65	2.135	21 43 14.76	138.31	9 11 46.5	844.9	68.24	16 13.0	59 24.9	I. S.
18	L	16 21.05	2.100	22 10 41.18	136.20	6 19 25.0	876.4	67.72	16 12.8	59 24.2	
19	U	4 46.08	2.075	22 37 45.73	134.68	-3 22 6.2	+894.5	67.35	16 12.1	59 21.8	I. S.
19	L	17 10.88	2.061	23 4 36.12	133.83	-0 22 28.2	899.7	67.14	16 11.0	59 17.9	
20	U	5 55.58	2.058	23 31 20.50	133.68	+ 2 36 55.4	892.3	67.11	16 9.6	59 12.7	I. S.
20	L	18 0.32	2.067	23 58 7.11	134.21	5 33 35.7	872.5	67.25	16 7.9	59 6.4	
21	U	6 25.23	2.086	0 25 3.90	135.37	+ 8 25 6.3	+840.6	67.54	16 5.9	58 59.1	I. S.
21	L	18 50.42	2.115	0 52 18.10	137.09	11 9 2.8	796.8	67.98	16 3.7	58 50.8	
22	U	7 16.01	2.151	1 19 55.88	139.27	13 43 2.3	741.1	68.51	16 1.2	58 41.7	I. S.
22	L	19 42.07	2.192	1 48 1.82	141.76	16 4 43.8	673.8	69.12	15 58.5	58 31.7	
23	U	8 8.64	2.236	2 16 38.56	144.37	+18 11 50.5	+595.4	69.74	15 55.5	58 20.8	I. S.
23	L	20 35.72	2.278	2 45 46.27	146.88	20 2 12.8	506.6	70.33	15 52.3	58 9.2	
24	U	9 3.27	2.314	3 15 22.30	149.05	21 33 53.8	408.8	70.84	15 48.9	57 56.7	I. S.
24	L	21 31.21	2.340	3 45 21.16	150.64	22 45 15.1	303.7	71.20	15 45.3	57 43.3	
25	U	9 59.38	2.363	4 15 34.59	151.45	+23 35 3.2	+193.7	71.86	15 41.4	57 29.2	I. S.
25	L	22 27.63	2.351	4 45 52.20	151.32	24 2 36.1	+ 81.6	71.30	15 37.3	57 14.3	
26	U	10 55.75	2.333	5 16 2.36	150.20	24 7 45.6	- 29.6	71.01	15 33.1	56 58.7	I. N.S.
26	L	23 23.55	2.298	5 45 53.28	148.13	23 50 59.4	137.2	70.48	15 28.7	56 42.7	
27	U	11 50.85	2.280	6 15 14.19	145.28	+23 13 17.2	-238.5	69.75	15 24.2	56 26.2	I. II. N.S.
28	L	0 17.51	2.191	6 43 56.17	141.68	22 16 6.9	331.6	68.86	15 19.7	56 9.6	
28	U	12 43.41	2.125	7 11 52.80	137.71	21 1 16.0	415.2	67.86	15 15.2	55 53.1	II. N.S.
29	L	1 8.50	2.056	7 39 0.45	133.55	19 30 44.5	488.3	66.81	15 10.8	55 37.0	
29	U	13 32.75	1.987	8 5 18.00	129.39	+17 46 37.1	-551.1	65.75	15 6.6	55 21.4	II. S.
30	L	1 56.19	1.921	8 30 46.71	125.43	15 50 57.8	608.7	64.73	15 2.6	55 6.7	
30	U	14 18.88	1.861	8 55 29.70	121.80	13 45 45.4	646.8	63.79	14 58.9	54 53.1	II. S.
31	L	2 40.88	1.897	9 19 31.53	118.59	11 32 50.2	681.1	62.95	14 55.6	54 41.0	
31	U	15 2.29	1.769	9 42 57.83	115.89	+ 9 13 53.6	-707.1	62.23	14 52.7	54 30.5	II. S.

Dec. 26, U Defective Illumination of N. 0°.00.  
Dec. 27, U Defective Illumination of II. 0°.05.

Dec. 27, U Defective Illumination of N. 0°.00.  
Dec. 28, U Defective Illumination of N. 0°.93.

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semi- diam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semi- diam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" "	" "	" "	s		h m	h m s	" "	" "	" "	s
Jan. 1	1 27	20 10 12.08	-21 24 9.6	8.6	3.3	0.23	Feb. 15	22 32	20 16 9.92	-20 1 11.5	8.4	3.2	0.23
2	1 27	20 14 40.02	20 59 40.9	8.8	3.3	0.24	16	22 33	20 21 13.91	19 53 42.2	8.3	3.1	0.22
3	1 27	20 18 43.30	20 34 58.3	9.0	3.4	0.24	17	22 34	20 26 24.72	19 44 57.2	8.2	3.1	0.22
4	1 27	20 22 18.89	20 10 17.8	9.3	3.5	0.25	18	22 36	20 31 41.78	19 34 56.4	8.1	3.1	0.22
5	1 26	20 25 23.54	19 45 57.0	9.6	3.6	0.25	19	22 37	20 37 4.55	19 23 39.1	8.0	3.0	0.21
6	1 25	20 27 53.87	-19 22 15.4	9.9	3.7	0.26	20	22 39	20 42 32.57	-19 11 4.9	7.9	3.0	0.21
7	1 23	20 29 46.56	18 59 33.2	10.2	3.9	0.27	21	22 40	20 48 5.40	18 57 14.0	7.8	3.0	0.21
8	1 20	20 30 58.39	18 38 11.9	10.5	4.0	0.28	22	22 42	20 53 42.69	18 42 5.8	7.7	2.9	0.21
9	1 17	20 31 26.53	18 18 32.5	10.8	4.1	0.28	23	22 44	20 59 24.07	18 25 40.1	7.6	2.9	0.20
10	1 12	20 31 8.71	18 0 55.6	11.1	4.2	0.29	24	22 45	21 5 9.25	18 7 57.2	7.5	2.9	0.20
11	1 7	20 30 3.48	-17 45 39.5	11.5	4.4	0.30	25	22 47	21 10 57.94	-17 48 56.7	7.5	2.8	0.20
12	1 2	20 28 10.56	17 32 59.3	11.8	4.5	0.31	26	22 49	21 16 49.92	17 28 38.4	7.4	2.8	0.20
13	0 55	20 25 31.09	17 23 5.9	12.1	4.6	0.32	27	22 51	21 22 44.96	17 7 2.8	7.3	2.8	0.19
14	0 48	20 22 7.80	17 16 5.3	12.4	4.7	0.33	28	22 53	21 28 42.91	16 44 9.5	7.2	2.8	0.19
15	0 40	20 18 5.23	17 11 57.8	12.6	4.8	0.34	Mar. 1	22 55	21 34 43.57	16 19 58.9	7.2	2.7	0.19
16	0 31	20 13 29.58	-17 10 37.0	12.9	4.9	0.34	2	22 57	21 40 46.85	-15 54 30.7	7.1	2.7	0.19
17	0 22	20 8 28.60	17 11 52.5	13.0	5.0	0.34	3	22 59	21 46 52.60	15 27 45.2	7.1	2.7	0.19
18	0 13	20 3 11.18	17 15 28.6	13.2	5.0	0.35	4	23 2	21 53 0.73	14 59 42.4	7.0	2.7	0.18
19	0 4	19 57 46.81	17 21 7.3	13.2	5.0	0.35	5	23 4	21 59 11.20	14 30 22.7	7.0	2.6	0.18
19	23 55	19 52 25.03	17 28 28.8	13.3	5.0	0.35	6	23 6	22 5 23.93	13 59 46.1	6.9	2.6	0.18
20	23 45	19 47 14.80	-17 37 13.2	13.2	5.0	0.35	7	23 8	22 11 38.89	-13 27 52.7	6.9	2.6	0.18
21	23 37	19 42 24.04	17 47 1.8	13.1	5.0	0.35	8	23 11	22 17 56.07	12 54 42.9	6.8	2.6	0.18
22	23 28	19 37 59.32	17 57 37.3	13.0	4.9	0.35	9	23 13	22 24 15.45	12 20 16.9	6.8	2.6	0.18
23	23 21	19 34 5.63	18 8 44.7	12.9	4.9	0.34	10	23 16	22 30 37.10	11 44 35.0	6.8	2.6	0.17
24	23 13	19 30 46.46	18 20 10.2	12.7	4.8	0.34	11	23 18	22 37 0.99	11 7 37.5	6.7	2.5	0.17
25	23 7	19 28 3.83	-18 31 42.6	12.5	4.7	0.33	12	23 21	22 43 27.18	-10 29 24.8	6.7	2.5	0.17
26	23 1	19 25 58.57	18 43 11.9	12.2	4.6	0.33	13	23 23	22 49 55.74	9 49 57.4	6.7	2.5	0.17
27	22 55	19 24 30.47	18 54 29.3	12.0	4.6	0.32	14	23 26	22 56 26.75	9 9 15.7	6.6	2.5	0.17
28	22 50	19 23 38.58	19 5 27.1	11.7	4.5	0.32	15	23 28	23 3 0.27	8 27 20.6	6.6	2.5	0.17
29	22 46	19 23 21.42	19 15 58.8	11.5	4.4	0.31	16	23 31	23 9 36.39	7 44 12.5	6.6	2.5	0.17
30	22 43	19 23 37.10	-19 25 58.2	11.3	4.3	0.30	17	23 34	23 16 15.22	-6 59 52.8	6.6	2.5	0.17
31	22 39	19 24 23.57	19 35 19.9	11.0	4.2	0.30	18	23 36	23 22 56.87	6 14 22.0	6.5	2.5	0.17
Feb. 1	22 37	19 25 38.68	19 43 59.1	10.8	4.1	0.29	19	23 39	23 29 41.42	5 27 41.5	6.5	2.5	0.17
2	22 34	19 27 20.29	19 51 51.3	10.6	4.0	0.29	20	23 42	23 36 28.99	4 39 52.9	6.5	2.5	0.17
3	22 33	19 29 26.28	19 58 52.8	10.3	3.9	0.28	21	23 45	23 43 19.68	3 50 57.8	6.5	2.5	0.16
4	22 31	19 31 54.63	-20 5 0.1	10.1	3.8	0.27	22	23 48	23 50 13.62	-3 0 58.3	6.5	2.5	0.16
5	22 30	19 34 43.41	20 10 9.9	9.9	3.8	0.27	23	23 51	23 57 10.85	2 9 56.8	6.5	2.5	0.16
6	22 29	19 37 50.90	20 14 19.5	9.8	3.7	0.26	24	23 54	0 4 11.46	1 17 56.2	6.5	2.5	0.16
7	22 29	19 41 15.43	20 17 26.4	9.6	3.6	0.26	25	23 57	0 11 15.53	-0 25 0.0	6.5	2.5	0.16
8	22 28	19 44 55.51	20 19 28.6	9.4	3.6	0.25	27	0 0	0 18 23.02	+ 0 28 48.3	6.5	2.5	0.16
9	22 28	19 48 49.78	-20 20 23.9	9.2	3.5	0.25	28	0 3	0 25 33.95	+ 1 23 23.6	6.5	2.5	0.16
10	22 28	19 52 56.95	20 20 10.8	9.1	3.4	0.25	29	0 7	0 32 48.23	2 18 40.7	6.6	2.5	0.17
11	22 29	19 57 15.87	20 18 47.5	8.9	3.4	0.24	30	0 10	0 40 5.73	3 14 33.4	6.6	2.5	0.17
12	22 29	20 1 45.54	20 16 13.2	8.8	3.3	0.24	31	0 13	0 47 26.25	4 10 54.8	6.6	2.5	0.17
13	22 30	20 6 24.99	20 12 26.2	8.7	3.3	0.23	Apr. 1	0 17	0 54 49.50	5 7 36.7	6.7	2.5	0.17
14	22 31	20 11 13.38	-20 7 26.0	8.5	3.2	0.23	2	0 20	1 2 15.08	+ 6 430.1	6.7	2.5	0.17
15	22 32	20 16 9.92	-20 1 11.5	8.4	3.2	0.23	3	0 24	1 9 42.50	+ 7 1 24.8	6.8	2.6	0.17

## FOR TRANSIT AT WASHINGTON.

	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semi- diam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semi- diam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" ' "	" "	" "	s		h m	h m s	" ' "	" "	" "	s
1	0 17	0 54 49.50	+ 5 7 36.7	6.7	2.5	0.17	May 16	23 52	3 31 2.07	+17 57 11.5	16.0	6.0	0.42
2	0 20	1 2 15.08	6 4 30.1	6.7	2.5	0.17		17 23 46	3 28 58.23	17 32 12.5	16.0	6.0	0.42
3	0 24	1 9 42.50	7 1 24.8	6.8	2.6	0.17		18 23 40	3 26 58.20	17 7 46.9	15.9	6.0	0.42
4	0 27	1 17 11.18	7 58 10.2	6.8	2.6	0.17		19 23 34	3 25 4.07	16 44 11.5	15.9	6.0	0.42
5	0 31	1 24 40.36	8 54 34.0	6.9	2.6	0.18		20 23 28	3 23 17.75	16 21 42.8	15.8	6.0	0.42
6	0 34	1 32 9.24	+ 9 50 23.9	7.0	2.6	0.18		21 23 23	3 21 40.98	+16 0 35.1	15.7	5.9	0.41
7	0 38	1 39 36.85	10 45 26.8	7.1	2.7	0.18		22 23 17	3 20 15.26	15 41 1.9	15.5	5.9	0.41
8	0 41	1 47 2.14	11 39 29.4	7.2	2.7	0.18		23 23 12	3 19 1.95	15 23 14.6	15.4	5.8	0.40
9	0 45	1 54 23.97	12 32 18.0	7.3	2.8	0.19		24 23 7	3 18 2.14	15 7 22.7	15.2	5.7	0.40
10	0 48	2 1 41.11	13 23 39.8	7.4	2.8	0.19		25 23 3	3 17 16.78	14 53 33.8	14.9	5.7	0.39
11	0 51	2 8 52.31	+14 13 22.1	7.5	2.9	0.19		26 22 58	3 16 46.59	+14 41 53.4	14.7	5.6	0.39
12	0 54	2 15 56.28	15 1 13.4	7.7	2.9	0.20		27 22 54	3 16 32.12	14 32 25.5	14.5	5.5	0.38
13	0 57	2 22 51.73	15 47 3.1	7.8	3.0	0.20		28 22 50	3 16 33.75	14 25 12.5	14.2	5.4	0.37
14	1 0	2 29 37.41	16 30 42.1	8.0	3.0	0.21		29 22 47	3 16 51.76	14 20 14.8	14.0	5.3	0.37
15	1 3	2 36 12.09	17 12 2.2	8.1	3.1	0.21		30 22 43	3 17 26.31	14 17 31.9	13.7	5.2	0.36
16	1 5	2 42 34.60	+17 50 57.1	8.3	3.2	0.22		31 22 40	3 18 17.43	+14 17 1.8	13.4	5.1	0.35
17	1 7	2 48 43.85	18 27 21.8	8.5	3.2	0.23	June 1	1 22 37	3 19 25.11	14 18 42.0	13.2	5.0	0.34
18	1 9	2 54 38.79	19 1 12.5	8.7	3.3	0.23		2 22 35	3 20 49.27	14 22 28.7	12.9	4.9	0.34
19	1 11	3 0 18.48	19 32 26.2	9.0	3.4	0.24		3 22 32	3 22 29.77	14 28 17.4	12.6	4.8	0.33
20	1 13	3 5 41.98	20 1 1.7	9.2	3.5	0.25		4 22 30	3 24 26.45	14 36 3.3	12.3	4.7	0.32
21	1 14	3 10 48.49	+20 26 58.1	9.5	3.6	0.25		5 22 29	3 26 39.13	+14 45 40.9	12.1	4.6	0.32
22	1 15	3 15 37.23	20 50 15.4	9.7	3.7	0.26		6 22 27	3 29 7.68	14 57 4.7	11.8	4.5	0.31
23	1 15	3 20 7.48	21 10 53.8	10.0	3.8	0.27		7 22 26	3 31 51.89	15 10 8.9	11.5	4.4	0.30
24	1 15	3 24 18.61	21 28 54.2	10.2	3.9	0.28		8 22 25	3 34 51.60	15 24 46.7	11.3	4.3	0.30
25	1 15	3 28 10.00	21 44 17.8	10.5	4.0	0.28		9 22 24	3 38 6.65	15 40 52.1	11.0	4.2	0.29
26	1 15	3 31 41.12	+21 57 6.0	10.8	4.1	0.29		10 22 24	3 41 36.94	+15 58 18.5	10.8	4.1	0.28
27	1 14	3 34 51.53	22 7 20.2	11.1	4.2	0.30		11 22 24	3 45 22.33	16 16 59.0	10.5	4.0	0.28
28	1 13	3 37 40.76	22 15 1.9	11.4	4.3	0.31		12 22 24	3 49 22.76	16 36 46.9	10.3	3.9	0.27
29	1 12	3 40 8.53	22 20 12.5	11.7	4.5	0.32		13 22 24	3 53 38.18	16 57 35.2	10.1	3.8	0.27
30	1 10	3 42 14.58	22 22 54.2	12.1	4.6	0.33		14 22 25	3 58 8.56	17 19 16.9	9.9	3.7	0.26
1	1 8	3 43 58.77	+22 23 8.3	12.4	4.7	0.34		15 22 26	4 2 53.94	+17 41 44.8	9.6	3.7	0.26
2	1 5	3 45 21.10	22 20 56.8	12.7	4.8	0.35		16 22 27	4 7 54.30	18 4 51.3	9.4	3.6	0.25
3	1 2	3 46 21.69	22 16 22.3	13.0	4.9	0.35		17 22 28	4 13 9.74	18 28 28.7	9.2	3.5	0.25
4	0 59	3 47 0.81	22 9 27.5	13.3	5.1	0.36		18 22 30	4 18 40.31	18 52 28.9	9.0	3.4	0.24
5	0 55	3 47 18.91	22 0 15.7	13.6	5.2	0.37		19 22 31	4 24 26.11	19 16 43.8	8.8	3.4	0.24
6	0 51	3 47 16.68	+21 48 50.8	14.0	5.3	0.38		20 22 33	4 30 27.24	+19 41 4.6	8.7	3.3	0.23
7	0 47	3 46 54.94	21 35 18.1	14.2	5.4	0.39		21 22 36	4 36 43.75	20 5 22.2	8.5	3.2	0.23
8	0 42	3 46 14.77	21 19 43.8	14.5	5.5	0.39		22 22 38	4 43 15.73	20 29 27.1	8.3	3.2	0.23
9	0 37	3 45 17.48	21 2 15.3	14.8	5.6	0.40		23 22 41	4 50 3.21	20 53 9.2	8.1	3.1	0.22
10	0 32	3 44 4.56	20 43 1.8	15.0	5.7	0.40		24 22 44	4 57 6.19	21 16 18.1	8.0	3.0	0.22
11	0 27	3 42 37.76	+20 22 13.4	15.2	5.8	0.41		25 22 48	5 4 24.56	+21 38 42.6	7.9	3.0	0.22
12	0 21	3 40 58.99	20 0 2.7	15.4	5.9	0.42		26 22 51	5 11 58.15	22 0 11.2	7.7	2.9	0.21
13	0 16	3 39 10.33	19 36 42.5	15.6	5.9	0.42		27 22 55	5 19 46.70	22 20 32.3	7.6	2.9	0.21
14	0 10	3 37 13.98	19 12 29.0	15.7	6.0	0.42		28 22 59	5 27 49.76	22 39 33.6	7.5	2.8	0.21
15	0 4	3 35 12.25	18 47 37.6	15.8	6.0	0.42		29 23 3	5 36 6.79	22 57 2.7	7.3	2.8	0.20
15	23 58	3 33 7.50	+18 22 25.8	15.9	6.0	0.42		30 23 8	5 44 37.05	+23 12 47.6	7.2	2.8	0.20
16	23 52	3 31 2.07	+17 57 11.5	16.0	6.0	0.42	July 1	23 13	5 53 19.64	+23 28 36.5	7.1	2.7	0.20

## FOR TRANSIT AT WASHINGTON.

Date	Time	Apparent Right Ascension	Apparent Declination	Par. Par.	Reduction	N. of true Time, Min.	Date	Time	Apparent Right Ascension	Apparent Declination	Par. Par.	Reduction	N. of true Time, Min.
July	1	22 13 7.34	-22 28 32.5	1.7	0.19		Aug. 17	1 43 11 25	1 29	-2 28 47.9	9.8	3.3	0.22
	2	22 13 7.34	-22 28 32.5	1.7	0.19		18	1 43 11 28 59.7	1 50	28.7	9.9	3.4	0.23
	3	22 13 7.34	-22 28 32.5	1.7	0.19		19	1 43 11 32 45.85	1 54	51.8	9.1	3.4	0.23
	4	22 13 7.34	-22 28 32.5	1.7	0.19		20	1 42 11 36 11.9	0 40	7.1	9.2	3.5	0.23
	5	22 13 7.34	-22 28 32.5	1.7	0.19		21	1 42 11 40 3.21	0 6	17.5	9.3	3.5	0.24
	6	22 13 7.34	-22 28 32.5	1.7	0.19		22	1 41 11 43 25.55	0 28	32.5	9.5	3.6	0.24
	7	22 13 7.34	-22 28 32.5	1.7	0.19		23	1 41 11 46 38.58	0 58	17.8	9.6	3.7	0.24
	8	22 13 7.34	-22 28 32.5	1.7	0.19		24	1 40 11 49 40.91	1 28	52.7	9.8	3.7	0.25
	9	22 13 7.34	-22 28 32.5	1.7	0.19		25	1 39 11 52 32.35	1 58	11.4	10.0	3.8	0.25
	10	0 1 7.17	6.37	23 39 25.5	2.5	0.18	26	1 37 11 55 12.29	2 26	7.5	10.1	3.8	0.26
	11	0 1 7.17	6.37	23 39 25.5	2.5	0.18	27	1 36 11 57 40.07	2 52	34.0	10.3	3.9	0.26
	12	0 1 7.17	6.37	23 39 25.5	2.5	0.18	28	1 34 11 59 54.99	3 17	23.5	10.5	4.0	0.27
	13	0 1 7.17	6.37	23 39 25.5	2.5	0.18	29	1 32 12 1 56.30	3 40	27.8	10.7	4.0	0.27
	14	0 22 7.54	7.79	22 35 12.3	2.6	0.18	30	1 30 12 3 43.15	4 1 38.1	10.9	4.1	0.27	
	15	0 27 8.3	8.98	22 13 0.6	2.6	0.18	31	1 28 12 5 14.79	4 20 45.1	11.1	4.2	0.28	
	16	0 32 8.11	53.24	-21 45 55.8	2.6	0.18	Sept. 1	1 25 12 6 30.22	4 37 38.7	11.3	4.3	0.28	
	17	0 37 8.20	31.87	-21 22 44.2	2.6	0.18	2	1 22 12 7 28.54	4 52 8.2	11.5	4.4	0.29	
	18	0 41 8.29	0.41	-20 54 42.4	2.6	0.18	3	1 19 12 8 8.50	5 4 2.1	11.7	4.4	0.30	
	19	0 45 8.37	18.55	-20 24 59.2	2.6	0.18	4	1 15 12 9 30.11	5 13 8.5	11.9	4.5	0.30	
	20	0 50 8.45	26.09	-19 53 43.4	2.6	0.18	5	1 11 12 8 31.59	5 19 15.0	12.1	4.6	0.31	
	21	0 54 8.53	22.91	-19 21 3.4	2.6	0.18	6	1 7 12 8 12.48	5 22 9.2	12.3	4.7	0.31	
	22	0 57 9.1	8.96	-18 47 7.5	2.6	0.18	7	1 3 12 7 32.12	5 21 39.2	12.6	4.8	0.32	
	23	1 1 9 8.44	4.1	-18 12 3.4	2.6	0.18	8	0 58 12 6 30.05	5 17 33.0	12.8	4.8	0.32	
	24	1 5 9.16	9.24	-17 35 58.4	2.6	0.18	9	0 52 12 5 6.13	5 9 40.8	12.9	4.9	0.33	
	25	1 8 9.23	23.64	-16 58 59.6	2.6	0.18	10	0 47 12 3 20.51	4 57 54.4	13.1	5.0	0.33	
	26	1 11 9.30	27.82	-16 21 13.4	2.6	0.18	11	0 41 12 1 13.76	4 42 8.6	13.3	5.0	0.34	
	27	1 14 9.37	21.93	-15 42 45.8	2.7	0.18	12	0 34 11 58 47.00	4 22 22.2	13.4	5.1	0.34	
	28	1 17 9.44	6.22	-15 3 43.0	2.7	0.19	13	0 27 11 56 1.89	3 58 39.0	13.6	5.1	0.34	
	29	1 19 9.50	40.92	-14 24 10.1	2.7	0.19	14	0 21 11 53 0.76	3 31 9.2	13.6	5.2	0.35	
	30	1 22 9.57	6.22	-13 44 12.4	2.7	0.19	15	0 13 11 49 46.56	3 0 9.1	13.7	5.2	0.35	
Aug. 1	1	1 24 10 3 22.37	+13 3 54.6	7.3	2.8	0.19	16	0 6 11 46 22.91	2 26 3.2	13.7	5.2	0.35	
2	2	1 26 10 9 29.55	12 23 21.2	7.3	2.8	0.19	16 23 59 11 42 54.05	1 49 22.8	13.7	5.2	0.35		
3	3	1 28 10 15 28.01	11 42 36.7	7.4	2.8	0.19	17 23 51 11 39 24.69	1 10 46.5	13.6	5.2	0.34		
4	4	1 30 10 21 17.94	11 1 44.9	7.5	2.8	0.19	18 23 44 11 35 59.89	0 30 59.0	13.5	5.1	0.34		
5	5	1 32 10 26 59.49	10 20 49.5	7.6	2.9	0.19	19 23 37 11 32 44.95	0 9 10.8	13.3	5.1	0.34		
6	6	1 34 10 32 32.85	+ 9 39 55.2	7.7	2.9	0.20	20 23 30 11 29 45.03	0 48 51.9	13.1	5.0	0.33		
7	7	1 35 10 37 58.14	8 59 4.5	7.8	2.9	0.20	21 23 23 11 27 5.11	1 27 12.6	12.9	4.9	0.33		
8	8	1 36 10 43 15.49	8 18 21.3	7.8	3.0	0.20	22 23 17 11 24 49.71	2 3 24.4	12.6	4.8	0.32		
9	9	1 38 10 48 25.01	7 37 49.0	7.9	3.0	0.20	23 23 11 11 23 2.73	2 36 41.9	12.3	4.7	0.31		
10	10	1 39 10 53 26.75	6 57 31.2	8.0	3.0	0.20	24 23 6 11 21 47.31	3 6 26.3	12.0	4.6	0.31		
11	11	1 40 10 58 20.76	+ 6 17 30.9	8.1	3.1	0.21	25 23 2 11 21 5.83	+3 32 4.8	11.7	4.4	0.30		
12	12	1 40 11 3 7.05	5 37 51.6	8.2	3.1	0.21	26 22 58 11 20 59.76	3 53 12.4	11.3	4.3	0.29		
13	13	1 41 11 7 45.62	4 58 36.6	8.3	3.2	0.21	27 22 54 11 21 29.76	4 9 31.1	11.0	4.2	0.28		
14	14	1 42 11 12 16.41	4 19 49.1	8.5	3.2	0.21	28 22 51 11 22 35.73	4 20 50.5	10.7	4.1	0.27		
15	15	1 42 11 16 39.36	3 41 32.8	8.6	3.2	0.22	29 22 49 11 24 16.85	4 27 6.2	10.3	3.9	0.26		
16	16	1 43 11 20 54.35	+ 3 35 13.8	8.7	3.3	0.22	30 22 47 11 26 31.71	+4 28 20.4	10.0	3.8	0.26		
17	17	1 43 11 25 1.23	+ 2 26 47.9	8.8	3.3	0.22	Oct. 1 22 46 11 29 18.41	+4 24 40.0	9.7	3.7	0.25		

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m s	h m s	" ' "	"	"	s		h m s	h m s	" ' "	"	"	s
Oct. 1	22 46	11 29 18.41	+ 4 24 40.0	9.7	3.7	0.25	Nov. 15	0 12	15 49 11.38	-21 7 35.1	6.1	2.3	0.17
2	22 45	11 32 34.70	4 16 16.2	9.4	3.6	0.24	16	0 15	15 55 37.87	21 33 2.3	6.2	2.3	0.17
3	22 45	11 36 18.06	4 3 23.8	9.1	3.5	0.23	17	0 17	16 2 5.64	21 57 25.8	6.2	2.3	0.17
4	22 45	11 40 25.83	3 46 20.3	8.9	3.4	0.23	18	0 20	16 8 34.68	22 20 44.0	6.2	2.4	0.17
5	22 46	11 44 55.28	3 25 25.0	8.6	3.3	0.22	19	0 22	16 15 4.95	22 42 55.4	6.2	2.4	0.17
6	22 47	11 49 43.78	+ 3 0 58.2	8.4	3.2	0.21	20	0 25	16 21 36.45	-23 3 58.6	6.3	2.4	0.17
7	22 48	11 54 48.72	2 33 21.1	8.2	3.1	0.21	21	0 28	16 28 9.10	23 23 52.3	6.3	2.4	0.17
8	22 49	12 0 7.73	2 2 54.6	8.0	3.0	0.20	22	0 30	16 34 42.84	23 42 34.8	6.3	2.4	0.17
9	22 51	12 5 58.58	1 29 59.1	7.8	3.0	0.20	23	0 33	16 41 17.58	24 0 4.8	6.4	2.4	0.18
10	22 53	12 11 19.28	0 54 54.3	7.7	2.9	0.19	24	0 35	16 47 53.20	24 16 21.1	6.4	2.4	0.18
11	22 55	12 17 8.05	+ 0 17 58.8	7.5	2.8	0.19	25	0 38	16 54 29.59	-24 31 22.2	6.4	2.4	0.18
12	22 57	12 23 3.33	- 0 20 30.0	7.4	2.8	0.19	26	0 41	17 1 6.54	24 45 6.3	6.5	2.5	0.18
13	22 59	12 29 3.82	1 0 16.4	7.2	2.8	0.18	27	0 43	17 7 43.89	24 57 32.3	6.5	2.5	0.18
14	23 1	12 35 8.35	1 41 5.9	7.1	2.7	0.18	28	0 46	17 14 21.39	25 8 38.8	6.6	2.5	0.18
15	23 3	12 41 15.99	2 22 45.1	7.0	2.7	0.18	29	0 49	17 20 58.79	25 18 24.4	6.7	2.5	0.19
16	23 5	12 47 25.95	- 3 5 2.4	6.9	2.6	0.18	30	0 51	17 27 35.78	-25 26 48.1	6.7	2.5	0.19
17	23 7	12 53 37.58	3 47 47.3	6.8	2.6	0.17	Dec. 1	0 54	17 34 12.01	25 33 48.3	6.8	2.6	0.19
18	23 10	12 59 50.37	4 30 50.2	6.7	2.6	0.17	2	0 57	17 40 47.07	25 39 23.9	6.9	2.6	0.19
19	23 12	13 6 3.92	5 14 3.0	6.7	2.5	0.17	3	0 59	17 47 20.51	25 43 34.1	6.9	2.6	0.19
20	23 14	13 12 17.90	5 57 18.1	6.6	2.5	0.17	4	1 2	17 53 51.79	25 46 17.9	7.0	2.7	0.20
21	23 16	13 18 32.10	- 6 40 29.2	6.5	2.5	0.17	5	1 4	18 0 20.34	-25 47 34.7	7.1	2.7	0.20
22	23 19	13 24 46.34	7 23 30.2	6.5	2.5	0.17	6	1 7	18 6 45.43	25 47 23.9	7.2	2.7	0.20
23	23 21	13 31 0.51	8 6 16.6	6.4	2.4	0.16	7	1 9	18 13 6.33	25 45 46.3	7.3	2.8	0.20
24	23 23	13 37 14.56	8 48 43.5	6.4	2.4	0.16	8	1 12	18 19 22.14	25 42 39.2	7.4	2.8	0.21
25	23 26	13 43 28.47	9 30 46.9	6.3	2.4	0.16	9	1 14	18 25 31.89	25 38 5.6	7.5	2.9	0.21
26	23 28	13 49 42.19	-10 12 23.3	6.3	2.4	0.16	10	1 16	18 31 34.43	-25 32 5.7	7.7	2.9	0.22
27	23 30	13 55 55.82	10 53 29.6	6.3	2.4	0.16	11	1 18	18 37 28.47	25 24 40.9	7.8	3.0	0.22
28	23 32	14 2 9.39	11 34 2.8	6.2	2.4	0.16	12	1 20	18 43 12.60	25 15 53.2	8.0	3.0	0.23
29	23 35	14 8 22.94	12 14 0.5	6.2	2.3	0.16	13	1 21	18 48 45.16	25 5 45.1	8.1	3.1	0.23
30	23 37	14 14 36.57	12 53 20.3	6.2	2.3	0.16	14	1 23	18 54 4.32	24 54 20.0	8.3	3.1	0.23
31	23 39	14 20 50.35	-13 32 0.0	6.2	2.3	0.16	15	1 24	18 59 8.02	-24 41 42.3	8.5	3.2	0.23
Nov. 1	23 41	14 27 4.41	14 9 57.6	6.1	2.3	0.16	16	1 25	19 3 53.96	24 27 57.3	8.7	3.3	0.24
2	23 44	14 33 18.80	14 47 11.4	6.1	2.3	0.16	17	1 25	19 8 19.53	24 13 11.6	8.9	3.4	0.25
3	23 46	14 39 33.64	15 23 39.7	6.1	2.3	0.16	18	1 25	19 12 21.93	23 57 32.7	9.1	3.4	0.25
4	23 48	14 45 49.03	15 59 20.8	6.1	2.3	0.16	19	1 25	19 15 58.06	23 41 9.0	9.3	3.5	0.26
5	23 51	14 52 5.06	-16 34 13.0	6.1	2.3	0.16	20	1 24	19 19 4.59	-23 24 10.7	9.6	3.7	0.27
6	23 53	14 58 21.81	17 8 15.0	6.1	2.3	0.16	21	1 23	19 21 37.99	23 6 49.0	9.9	3.8	0.27
7	23 55	15 4 39.38	17 41 25.4	6.1	2.3	0.16	22	1 21	19 23 34.66	22 49 16.1	10.2	3.9	0.28
8	23 58	15 10 57.85	18 13 42.7	6.1	2.3	0.16	23	1 18	19 24 51.02	22 31 44.3	10.5	4.0	0.29
10	0 0	15 17 17.30	18 45 5.5	6.1	2.3	0.16	24	1 15	19 25 23.68	22 14 27.0	10.8	4.1	0.29
11	0 3	15 23 37.79	-19 15 32.5	6.1	2.3	0.16	25	1 10	19 25 9.71	-21 57 37.6	11.1	4.2	0.30
12	0 5	15 29 59.41	19 45 2.3	6.1	2.3	0.16	26	1 5	19 24 6.85	21 41 28.0	11.4	4.3	0.31
13	0 7	15 36 22.19	20 13 33.5	6.1	2.3	0.16	27	1 0	19 22 14.03	21 26 9.8	11.7	4.5	0.32
14	0 10	15 42 46.17	20 41 5.0	6.1	2.3	0.17	28	0 53	19 19 31.58	21 11 51.8	12.0	4.6	0.32
15	0 12	15 49 11.38	21 7 35.1	6.1	2.3	0.17	29	0 46	19 16 1.60	20 58 41.8	12.3	4.7	0.33
16	0 15	15 55 37.87	-21 33 2.3	6.2	2.3	0.17	30	0 38	19 11 48.24	-20 46 44.7	12.6	4.8	0.34
17	0 17	16 2 5.64	-21 57 25.8	6.2	2.3	0.17	31	0 29	19 6 57.75	-20 36 4.3	12.8	4.8	0.34

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m s	h m s	° ' "	"	"	s		h m s	h m s	° ' "	"	"	s
Jan. 0	22 3	16 46 2.78	-21 11 13.0	6.2	6.0	0.43	Feb. 15	23 7	20 51 31.88	-18 26 38.9	5.5	5.3	0.38
1	22 5	16 51 19.66	21 22 39.8	6.2	6.0	0.43	16	23 8	20 56 37.79	18 8 6.9	5.5	5.3	0.37
2	22 6	16 56 37.44	21 33 29.8	6.1	5.9	0.42	17	23 10	21 1 42.55	17 49 3.7	5.4	5.3	0.37
3	22 7	17 1 56.05	21 43 42.2	6.1	5.9	0.42	18	23 11	21 6 46.19	17 29 29.9	5.4	5.3	0.37
4	22 9	17 7 15.47	21 53 16.8	6.1	5.9	0.42	19	23 12	21 11 48.66	17 9 26.4	5.4	5.3	0.37
5	22 10	17 12 35.67	-22 2 12.9	6.1	5.9	0.42	20	23 13	21 16 49.97	-16 48 53.7	5.4	5.3	0.37
6	22 11	17 17 56.59	22 10 30.2	6.0	5.9	0.42	21	23 14	21 21 50.13	16 27 52.6	5.4	5.3	0.37
7	22 13	17 23 18.19	22 18 8.1	6.0	5.9	0.42	22	23 15	21 26 49.12	16 6 23.7	5.4	5.2	0.37
8	22 14	17 28 40.42	22 25 6.4	6.0	5.8	0.42	23	23 16	21 31 46.95	15 44 27.9	5.4	5.2	0.36
9	22 16	17 34 3.25	22 31 24.6	6.0	5.8	0.42	24	23 17	21 36 43.62	15 22 6.0	5.4	5.2	0.36
10	22 17	17 39 26.61	-22 37 2.4	6.0	5.8	0.42	25	23 18	21 41 39.16	-14 59 18.5	5.4	5.2	0.36
11	22 19	17 44 50.45	22 41 59.4	6.0	5.8	0.42	26	23 19	21 46 33.56	14 36 6.2	5.4	5.2	0.36
12	22 20	17 50 14.73	22 46 15.6	5.9	5.8	0.42	27	23 20	21 51 26.83	14 12 29.8	5.3	5.2	0.36
13	22 22	17 55 39.38	22 49 50.5	5.9	5.7	0.42	28	23 21	21 56 18.99	13 48 30.3	5.3	5.2	0.36
14	22 23	18 1 4.35	22 52 43.9	5.9	5.7	0.41	Mar. 1	23 22	22 1 10.07	13 24 8.1	5.3	5.2	0.36
15	22 25	18 6 29.57	-22 54 55.6	5.9	5.7	0.41	2	23 22	22 6 0.08	-12 59 24.1	5.3	5.2	0.35
16	22 26	18 11 55.00	22 56 25.4	5.9	5.7	0.41	3	23 23	22 10 49.05	12 34 19.0	5.3	5.2	0.35
17	22 27	18 17 20.56	22 57 13.3	5.9	5.7	0.41	4	23 24	22 15 36.98	12 8 53.5	5.3	5.2	0.35
18	22 29	18 22 46.21	22 57 19.2	5.8	5.7	0.41	5	23 25	22 20 23.91	11 43 8.3	5.3	5.2	0.35
19	22 30	18 28 11.87	22 56 42.9	5.8	5.7	0.41	6	23 26	22 25 9.88	11 17 4.2	5.3	5.1	0.35
20	22 32	18 33 37.50	-22 55 24.6	5.8	5.6	0.41	7	23 27	22 29 54.88	-10 50 42.0	5.3	5.1	0.35
21	22 33	18 39 3.02	22 53 24.2	5.8	5.6	0.41	8	23 27	22 34 38.98	10 24 2.2	5.3	5.1	0.35
22	22 35	18 44 28.34	22 50 41.8	5.8	5.6	0.41	9	23 28	22 39 22.18	9 57 5.8	5.3	5.1	0.35
23	22 36	18 49 53.45	22 47 17.5	5.8	5.6	0.41	10	23 29	22 44 4.53	9 29 53.3	5.3	5.1	0.35
24	22 38	18 55 18.27	22 43 11.4	5.7	5.6	0.40	11	23 30	22 48 46.06	9 2 25.6	5.3	5.1	0.34
25	22 39	19 0 42.73	-22 38 23.5	5.7	5.6	0.40	12	23 30	22 53 26.79	- 8 34 43.5	5.2	5.1	0.34
26	22 41	19 6 6.78	22 32 54.2	5.7	5.6	0.40	13	23 31	22 58 6.76	8 6 47.4	5.2	5.1	0.34
27	22 42	19 11 30.37	22 26 43.7	5.7	5.5	0.40	14	23 32	23 2 46.02	7 38 38.4	5.2	5.1	0.34
28	22 44	19 16 53.44	22 19 52.2	5.7	5.5	0.40	15	23 33	23 7 24.59	7 10 16.9	5.2	5.1	0.34
29	22 45	19 22 15.93	22 12 19.9	5.7	5.5	0.40	16	23 33	23 12 2.50	6 41 44.0	5.2	5.1	0.34
30	22 46	19 27 37.81	-22 4 7.1	5.7	5.5	0.40	17	23 34	23 16 39.79	- 6 13 0.1	5.2	5.1	0.34
31	22 48	19 32 59.02	21 55 14.3	5.6	5.5	0.40	18	23 35	23 21 16.51	5 44 6.1	5.2	5.1	0.34
Feb. 1	22 49	19 38 19.53	21 45 41.6	5.6	5.5	0.40	19	23 35	23 25 52.68	5 15 2.6	5.2	5.1	0.34
2	22 51	19 43 39.27	21 35 29.6	5.6	5.5	0.39	20	23 36	23 30 28.34	4 45 50.7	5.2	5.1	0.34
3	22 52	19 48 58.23	21 24 38.6	5.6	5.5	0.39	21	23 37	23 35 3.53	4 16 30.8	5.2	5.0	0.34
4	22 53	19 54 16.35	-21 13 8.8	5.6	5.4	0.39	22	23 37	23 39 38.28	- 3 47 3.8	5.2	5.0	0.34
5	22 55	19 59 33.61	21 1 1.1	5.6	5.4	0.39	23	23 38	23 44 12.64	3 17 30.4	5.2	5.0	0.34
6	22 56	20 4 49.96	20 48 15.6	5.6	5.4	0.38	24	23 39	23 48 46.63	2 47 51.3	5.2	5.0	0.34
7	22 57	20 10 5.38	20 34 53.0	5.6	5.4	0.38	25	23 39	23 53 20.31	2 18 7.4	5.2	5.0	0.33
8	22 59	20 15 19.83	20 20 53.6	5.5	5.4	0.38	26	23 40	23 57 53.70	1 48 19.2	5.2	5.0	0.33
9	23 0	20 20 33.29	-20 6 18.2	5.5	5.4	0.38	27	23 40	0 2 26.84	- 1 18 27.6	5.2	5.0	0.33
10	23 1	20 25 45.72	19 51 7.2	5.5	5.4	0.38	28	23 41	0 6 59.79	0 48 33.2	5.2	5.0	0.33
11	23 2	20 30 57.11	19 35 21.2	5.5	5.4	0.38	29	23 42	0 11 32.57	- 0 18 36.8	5.2	5.0	0.33
12	23 4	20 36 7.44	19 19 0.7	5.5	5.3	0.38	30	23 42	0 16 5.24	+ 0 11 21.0	5.2	5.0	0.33
13	23 5	20 41 16.69	19 2 6.5	5.5	5.3	0.38	31	23 43	0 20 37.83	0 41 19.4	5.1	5.0	0.33
14	23 6	20 46 24.84	-18 44 38.9	5.5	5.3	0.38	Apr. 1	23 43	0 25 10.39	+ 1 11 17.7	5.1	5.0	0.33
15	23 7	20 51 31.88	-18 26 38.9	5.5	5.3	0.38	2	23 44	0 29 42.95	+ 1 41 15.3	5.1	5.0	0.33

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pos. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pos. Mer.
	h m	h m s	° ' "	"	"	s		h m	h m s	° ' "	"	"	s
Apr. 1	23 43	0 25 10.39	+ 1 11 17.7	5.1	5.0	0.33	May 18	0 21	4 4 17.73	+20 40 33.9	5.1	5.0	0.35
2	23 44	0 29 42.95	1 41 15.3	5.1	5.0	0.33	19	0 22	4 9 26.26	20 56 50.9	5.1	5.0	0.35
3	23 45	0 34 15.56	2 11 11.4	5.1	5.0	0.33	20	0 23	4 14 35.84	21 12 33.3	5.1	5.0	0.35
4	23 45	0 38 48.28	2 41 5.3	5.1	5.0	0.33	21	0 25	4 19 46.46	21 27 40.4	5.1	5.0	0.36
5	23 46	0 43 21.13	3 10 56.3	5.1	5.0	0.33	22	0 26	4 24 58.08	21 42 11.7	5.1	5.0	0.36
6	23 46	0 47 54.17	+ 3 40 43.7	5.1	5.0	0.33	23	0 27	4 30 10.69	+21 56 6.4	5.1	5.0	0.36
7	23 47	0 52 27.42	4 10 26.8	5.1	5.0	0.33	24	0 28	4 35 24.24	22 9 24.2	5.1	5.0	0.36
8	23 48	0 57 0.94	4 40 5.0	5.1	5.0	0.33	25	0 30	4 40 38.71	22 22 4.5	5.1	5.0	0.36
9	23 48	1 1 34.78	5 9 37.4	5.1	5.0	0.33	26	0 31	4 45 54.06	22 34 6.7	5.1	5.0	0.36
10	23 49	1 6 8.96	5 39 3.3	5.1	5.0	0.33	27	0 32	4 51 10.26	22 45 30.2	5.2	5.0	0.36
11	23 49	1 10 43.54	+ 6 8 22.2	5.1	5.0	0.33	28	0 34	4 56 27.24	+22 56 14.6	5.2	5.0	0.36
12	23 50	1 15 18.55	6 37 33.1	5.1	5.0	0.33	29	0 35	5 1 44.98	23 6 19.5	5.2	5.0	0.36
13	23 51	1 19 54.04	7 6 35.4	5.1	5.0	0.33	30	0 36	5 7 3.44	23 15 44.6	5.2	5.0	0.36
14	23 51	1 24 30.04	7 35 28.5	5.1	5.0	0.33	31	0 38	5 12 22.58	23 24 29.2	5.2	5.0	0.37
15	23 52	1 29 6.59	8 4 11.4	5.1	5.0	0.33	June 1	0 39	5 17 42.33	23 32 33.0	5.2	5.0	0.37
16	23 53	1 33 43.74	+ 8 32 43.6	5.1	5.0	0.33	2	0 41	5 23 2.64	+23 39 55.8	5.2	5.0	0.37
17	23 53	1 38 21.52	9 1 4.2	5.1	5.0	0.33	3	0 42	5 28 23.48	23 46 37.0	5.2	5.0	0.37
18	23 54	1 42 59.94	9 29 12.6	5.1	5.0	0.33	4	0 43	5 33 44.80	23 52 36.5	5.2	5.0	0.37
19	23 55	1 47 39.06	9 57 7.9	5.1	5.0	0.33	5	0 45	5 39 6.52	23 57 54.0	5.2	5.1	0.37
20	23 56	1 52 18.91	10 24 49.5	5.1	5.0	0.34	6	0 46	5 44 28.62	24 2 29.3	5.2	5.1	0.37
21	23 56	1 56 59.51	+10 52 16.5	5.1	5.0	0.34	7	0 48	5 49 51.02	+24 6 22.0	5.2	5.1	0.37
22	23 57	2 1 40.90	11 19 28.2	5.1	5.0	0.34	8	0 49	5 55 13.67	24 9 32.0	5.2	5.1	0.37
23	23 58	2 6 23.11	11 46 23.9	5.1	5.0	0.34	9	0 50	6 0 36.53	24 11 59.2	5.2	5.1	0.37
24	23 59	2 11 6.16	12 13 2.8	5.1	5.0	0.34	10	0 52	6 5 59.51	24 18 43.3	5.2	5.1	0.37
25	23 59	2 15 50.08	12 39 24.2	5.1	5.0	0.34	11	0 53	6 11 22.58	24 14 44.3	5.3	5.1	0.37
27	0 0	2 20 34.90	+13 5 27.3	5.1	5.0	0.34	12	0 55	6 16 45.67	+24 15 2.2	5.3	5.1	0.37
28	0 1	2 25 20.64	13 31 11.4	5.1	5.0	0.34	13	0 56	6 22 8.72	24 14 37.0	5.3	5.1	0.37
29	0 2	2 30 7.33	13 56 35.8	5.1	5.0	0.34	14	0 58	6 27 31.65	24 13 28.4	5.3	5.1	0.37
30	0 3	2 34 55.01	14 21 39.7	5.1	5.0	0.34	15	0 59	6 32 54.42	24 11 36.8	5.3	5.1	0.37
May 1	0 3	2 39 43.67	14 46 22.4	5.1	5.0	0.34	16	1 1	6 38 16.96	24 9 1.9	5.3	5.1	0.37
2	0 4	2 44 33.35	+15 10 43.1	5.1	5.0	0.34	17	1 2	6 43 39.21	+24 5 44.2	5.3	5.1	0.37
3	0 5	2 49 24.06	15 34 41.1	5.1	5.0	0.34	18	1 3	6 49 1.10	24 1 43.6	5.3	5.2	0.37
4	0 6	2 54 15.84	15 58 15.6	5.1	5.0	0.34	19	1 5	6 54 22.58	23 57 0.3	5.3	5.2	0.37
5	0 7	2 59 8.69	16 21 26.0	5.1	5.0	0.34	20	1 6	6 59 43.60	23 51 34.4	5.3	5.2	0.38
6	0 8	3 4 2.64	16 44 11.5	5.1	5.0	0.34	21	1 8	7 5 4.08	23 45 26.1	5.3	5.2	0.38
7	0 9	3 8 57.67	+17 6 31.3	5.1	5.0	0.34	22	1 9	7 10 23.96	+23 38 36.0	5.4	5.2	0.38
8	0 10	3 13 53.82	17 28 24.8	5.1	5.0	0.34	23	1 10	7 15 43.19	23 31 4.1	5.4	5.2	0.38
9	0 11	3 18 51.10	17 49 51.3	5.1	5.0	0.34	24	1 12	7 21 1.72	23 22 50.7	5.4	5.2	0.38
10	0 12	3 23 49.52	18 10 50.0	5.1	5.0	0.35	25	1 13	7 26 19.48	23 13 56.4	5.4	5.2	0.38
11	0 13	3 28 49.07	18 31 20.1	5.1	5.0	0.35	26	1 14	7 31 36.44	23 4 21.4	5.4	5.2	0.38
12	0 14	3 33 49.77	+18 51 21.1	5.1	5.0	0.35	27	1 16	7 36 52.55	+22 54 6.1	5.4	5.2	0.38
13	0 15	3 38 51.61	19 10 52.1	5.1	5.0	0.35	28	1 17	7 42 7.76	22 43 10.9	5.4	5.2	0.38
14	0 16	3 43 54.58	19 29 52.4	5.1	5.0	0.35	29	1 18	7 47 22.01	22 31 36.3	5.4	5.3	0.38
15	0 18	3 48 58.70	19 48 21.5	5.1	5.0	0.35	30	1 20	7 52 35.29	22 19 22.8	5.4	5.3	0.38
16	0 19	3 54 3.93	20 6 18.5	5.1	5.0	0.35	July 1	1 21	7 57 47.53	22 6 30.9	5.5	5.3	0.38
17	0 20	3 59 10.28	+20 23 42.9	5.1	5.0	0.35	2	1 22	8 2 58.73	+21 53 0.8	5.5	5.3	0.38
18	0 21	4 4 17.73	+20 40 33.9	5.1	5.0	0.35	3	1 23	8 8 8.84	+21 38 53.4	5.5	5.3	0.38



## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.		
	h m	h m s	" ' "	" "	" "	s		h m	h m s	" ' "	" "	" "	s		
July	1	1 21	7 57 47.53	+22 6 30.9	5.5	5.3	0.38	Aug. 16	1 58	11 36 23.36	+ 3 45 3.3	6.3	6.1	0.41	
	2	1 22	8 2 58.73	21 53 0.8	5.5	5.3	0.38		17	1 58	11 40 46.94	3 14 25.9	6.3	6.1	0.41
	3	1 23	8 8 8.84	21 38 53.4	5.5	5.3	0.38		18	1 59	11 45 10.09	2 43 42.8	6.4	6.2	0.41
	4	1 25	8 13 17.83	21 24 9.0	5.5	5.3	0.38		19	1 59	11 49 32.86	2 12 54.8	6.4	6.2	0.41
	5	1 26	8 18 25.68	21 8 48.4	5.5	5.3	0.38		20	2 0	11 53 55.31	1 42 2.4	6.4	6.2	0.41
	6	1 27	8 23 32.37	+20 52 52.0	5.5	5.3	0.38		21	2 0	11 58 17.45	+ 1 11 6.4	6.4	6.2	0.42
	7	1 28	8 28 37.88	20 36 20.3	5.5	5.4	0.38		22	2 1	12 2 39.33	0 40 7.5	6.5	6.3	0.42
	8	1 29	8 33 42.18	20 19 13.9	5.5	5.4	0.38		23	2 1	12 7 0.99	+ 0 9 6.4	6.5	6.3	0.42
	9	1 30	8 38 45.26	20 1 33.7	5.6	5.4	0.38		24	2 1	12 11 22.46	- 0 21 56.1	6.5	6.3	0.42
	10	1 31	8 43 47.10	19 43 20.0	5.6	5.4	0.38		25	2 2	12 15 43.78	0 52 59.4	6.5	6.3	0.42
	11	1 32	8 48 47.72	+19 24 33.6	5.6	5.4	0.38		26	2 2	12 20 5.00	- 1 24 3.0	6.6	6.4	0.42
	12	1 33	8 53 47.07	19 5 15.2	5.6	5.4	0.38		27	2 3	12 24 26.15	1 55 5.8	6.6	6.4	0.43
	13	1 35	8 58 45.17	18 45 25.4	5.6	5.4	0.38		28	2 3	12 28 47.28	2 26 7.4	6.6	6.4	0.43
	14	1 35	9 3 41.99	18 25 4.8	5.6	5.5	0.38		29	2 3	12 33 8.41	2 57 7.0	6.7	6.5	0.43
	15	1 36	9 8 37.55	18 4 14.2	5.6	5.5	0.38		30	2 4	12 37 29.59	3 28 3.9	6.7	6.5	0.43
	16	1 37	9 13 31.85	+17 42 54.3	5.7	5.5	0.38	31	2 4	12 41 50.86	- 3 58 57.5	6.7	6.5	0.44	
	17	1 38	9 18 24.88	17 21 5.7	5.7	5.5	0.38	Sept. 1	2 5	12 46 12.27	4 29 47.2	6.8	6.6	0.44	
	18	1 39	9 23 16.64	16 58 49.2	5.7	5.5	0.38		2	5	12 50 33.87	5 03 2.2	6.8	6.6	0.44
	19	1 40	9 28 7.13	16 36 5.5	5.7	5.5	0.38		3	2	6 12 54 55.68	5 31 11.8	6.8	6.6	0.44
	20	1 41	9 32 56.36	16 12 55.4	5.7	5.6	0.39		4	2	6 12 59 17.76	6 1 45.6	6.9	6.7	0.45
	21	1 42	9 37 44.36	+15 49 19.6	5.7	5.6	0.39		5	2	6 13 3 40.13	- 6 32 12.6	6.9	6.7	0.45
	22	1 43	9 42 31.11	15 25 18.8	5.8	5.6	0.39		6	2	7 13 8 2.85	7 2 32.4	6.9	6.7	0.45
	23	1 44	9 47 16.64	15 0 53.8	5.8	5.6	0.39		7	2	7 13 12 25.97	7 32 44.1	7.0	6.8	0.46
	24	1 44	9 52 0.95	14 36 5.2	5.8	5.6	0.39		8	2	8 13 16 49.51	8 2 47.1	7.0	6.8	0.46
	25	1 45	9 56 44.07	14 10 53.8	5.8	5.6	0.39		9	2	8 13 21 13.52	8 32 40.6	7.0	6.8	0.46
	26	1 46	10 1 26.01	+13 45 20.4	5.8	5.7	0.39		10	2	9 13 25 38.01	- 9 2 24.0	7.1	6.9	0.46
	27	1 47	10 6 6.79	13 19 25.7	5.9	5.7	0.39		11	2	9 13 30 3.05	9 31 56.6	7.1	6.9	0.47
	28	1 47	10 10 46.44	12 53 10.6	5.9	5.7	0.39		12	2	10 13 34 28.67	10 1 17.7	7.1	6.9	0.47
	29	1 48	10 15 24.96	12 26 35.5	5.9	5.7	0.39		13	2	10 13 38 54.88	10 30 26.5	7.2	7.0	0.47
	30	1 49	10 20 2.40	11 59 41.4	5.9	5.7	0.39		14	2	11 13 43 21.74	10 59 22.4	7.2	7.0	0.47
	Aug.	31	1 49	10 24 38.78	+11 32 28.8	5.9	5.8		0.39	15	2	11 13 47 49.28	-11 28 4.6	7.3	7.1
1		1 50	10 29 14.12	11 4 58.6	6.0	5.8	0.39	16	2	12 13 52 17.50	11 56 32.3	7.3	7.1	0.48	
2		1 51	10 33 48.44	10 37 11.4	6.0	5.8	0.39	17	2	12 13 56 46.46	12 24 44.9	7.3	7.1	0.48	
3		1 51	10 38 21.80	10 9 8.1	6.0	5.8	0.39	18	2	13 14 1 16.17	12 52 41.7	7.4	7.2	0.49	
4		1 52	10 42 54.22	9 40 49.1	6.0	5.8	0.39	19	2	13 14 5 46.65	13 20 21.9	7.4	7.2	0.49	
5		1 52	10 47 25.74	+ 9 12 15.4	6.0	5.9	0.40	20	2	14 14 10 17.94	-13 47 44.6	7.5	7.3	0.49	
6		1 53	10 51 56.39	8 43 27.5	6.1	5.9	0.40	21	2	14 14 14 50.05	14 14 49.2	7.5	7.3	0.50	
7		1 54	10 56 26.21	8 14 26.1	6.1	5.9	0.40	22	2	15 14 19 23.01	14 41 35.2	7.5	7.3	0.50	
8		1 54	11 0 55.24	7 45 11.9	6.1	5.9	0.40	23	2	16 14 23 56.83	15 8 1.6	7.6	7.4	0.50	
9		1 55	11 5 23.51	7 15 45.7	6.1	5.9	0.40	24	2	16 14 28 31.54	15 34 7.7	7.6	7.4	0.51	
10		1 55	11 9 51.06	+ 6 46 8.1	6.2	6.0	0.40	25	2	17 14 33 7.14	-15 59 52.9	7.7	7.5	0.51	
11		1 56	11 14 17.92	6 16 19.8	6.2	6.0	0.40	26	2	18 14 37 43.65	16 25 16.2	7.7	7.5	0.52	
12		1 56	11 18 44.15	5 46 21.7	6.2	6.0	0.40	27	2	18 14 42 21.09	16 50 17.2	7.8	7.6	0.52	
13		1 57	11 23 9.76	5 16 14.1	6.2	6.0	0.40	28	2	19 14 46 59.47	17 14 55.1	7.8	7.6	0.53	
14		1 57	11 27 34.81	4 45 58.2	6.3	6.1	0.41	29	2	20 14 51 38.80	17 39 9.0	7.9	7.7	0.53	
15	1 58	11 31 59.33	+ 4 15 34.3	6.3	6.1	0.41	30	2	20 14 56 19.08	-18 2 58.4	7.9	7.7	0.54		
16	1 58	11 36 23.36	+ 3 45 3.3	6.3	6.1	0.41	Oct. 1	2 21	15 1 0.34	-18 26 22.5	8.0	7.7	0.54		

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam. S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam. S. T. of Sem. Pass. Mer.
	h m	h m s	" " "	"	" s		h m	h m s	" " "	"	" s
Oct. 1	2 21	15 1 0.34	-18 26 22.5	8.0	7.7 0.54	Nov. 15	3 5	18 42 22.93	-26 8 46.8	11.3	11.0 0.81
2	2 22	15 5 42.58	18 49 20.8	8.0	7.8 0.55	16	3 6	18 47 12.08	26 3 58.2	11.4	11.1 0.82
3	2 23	15 10 25.80	19 11 52.3	8.1	7.8 0.55	17	3 7	18 51 59.73	25 58 30.7	11.5	11.2 0.83
4	2 23	15 15 10.02	19 33 56.7	8.1	7.9 0.56	18	3 8	18 56 45.81	25 52 24.7	11.6	11.3 0.83
5	2 24	15 19 55.23	19 55 32.9	8.2	8.0 0.56	19	3 8	19 1 30.23	25 45 40.8	11.7	11.4 0.84
6	2 25	15 24 41.43	-20 16 40.5	8.2	8.0 0.57	20	3 9	19 6 12.88	-25 38 19.3	11.9	11.6 0.85
7	2 26	15 29 28.62	20 37 18.7	8.3	8.0 0.57	21	3 10	19 10 53.69	25 30 20.8	12.0	11.7 0.86
8	2 27	15 34 16.79	20 57 26.8	8.3	8.1 0.58	22	3 11	19 15 32.56	25 21 46.0	12.1	11.8 0.87
9	2 28	15 39 5.93	21 17 4.2	8.4	8.2 0.58	23	3 11	19 20 9.38	25 12 35.4	12.2	11.9 0.88
10	2 29	15 43 56.03	21 36 10.5	8.4	8.2 0.59	24	3 12	19 24 44.09	25 2 49.6	12.4	12.0 0.88
11	2 29	15 48 47.07	-21 54 44.6	8.5	8.3 0.59	25	3 12	19 29 16.61	-24 52 29.4	12.5	12.1 0.89
12	2 30	15 53 39.03	22 12 46.0	8.6	8.3 0.60	26	3 13	19 33 46.83	24 41 35.2	12.6	12.3 0.90
13	2 31	15 58 31.87	22 30 14.3	8.6	8.4 0.60	27	3 14	19 38 14.69	24 30 7.8	12.8	12.4 0.91
14	2 32	16 3 25.60	22 47 8.6	8.7	8.5 0.61	28	3 14	19 42 40.09	24 18 8.1	12.9	12.5 0.92
15	2 33	16 8 20.15	23 3 28.4	8.7	8.5 0.62	29	3 14	19 47 2.98	24 5 36.6	13.1	12.7 0.93
16	2 34	16 13 15.51	-23 19 13.3	8.8	8.5 0.62	30	3 15	19 51 23.28	-23 52 34.2	13.2	12.8 0.94
17	2 35	16 18 11.65	23 34 22.4	8.9	8.6 0.63	Dec. 1	3 15	19 55 40.89	23 39 1.7	13.4	13.0 0.94
18	2 36	16 23 8.50	23 48 55.4	8.9	8.7 0.63	2	3 15	19 59 55.78	23 24 59.7	13.5	13.1 0.95
19	2 37	16 28 6.02	24 2 51.7	9.0	8.7 0.64	3	3 16	20 4 7.84	23 10 29.2	13.7	13.3 0.96
20	2 38	16 33 4.16	24 16 10.8	9.1	8.8 0.64	4	3 16	20 8 17.03	22 55 30.8	13.8	13.4 0.97
21	2 39	16 38 2.88	-24 28 52.4	9.1	8.9 0.65	5	3 16	20 12 23.24	-22 40 5.7	14.0	13.6 0.98
22	2 40	16 43 2.12	24 40 55.8	9.2	8.9 0.65	6	3 16	20 16 26.42	22 24 14.6	14.2	13.8 0.99
23	2 41	16 48 1.81	24 52 20.6	9.3	9.0 0.66	7	3 16	20 20 26.47	22 7 58.4	14.3	13.9 1.00
24	2 42	16 53 1.90	25 3 6.6	9.3	9.1 0.67	8	3 16	20 24 23.36	21 51 17.8	14.5	14.1 1.01
25	2 44	16 58 2.33	25 13 13.3	9.4	9.1 0.68	9	3 16	20 28 16.97	21 34 14.2	14.7	14.3 1.02
26	2 45	17 3 3.02	-25 22 40.3	9.5	9.2 0.68	10	3 16	20 32 7.25	-21 16 48.1	14.9	14.5 1.03
27	2 46	17 8 3.93	25 31 27.5	9.6	9.3 0.69	11	3 16	20 35 54.08	20 59 0.8	15.1	14.6 1.04
28	2 47	17 13 4.97	25 39 34.3	9.6	9.4 0.69	12	3 16	20 39 37.42	20 40 53.1	15.2	14.8 1.05
29	2 48	17 18 6.08	25 47 0.8	9.7	9.4 0.70	13	3 16	20 43 17.15	20 22 26.1	15.4	15.0 1.06
30	2 49	17 23 7.18	25 53 46.5	9.8	9.5 0.71	14	3 15	20 46 53.20	20 3 41.1	15.6	15.2 1.07
31	2 50	17 28 8.22	-25 59 51.5	9.9	9.6 0.71	15	3 15	20 50 25.47	-19 44 38.8	15.9	15.4 1.08
Nov. 1	2 51	17 33 9.12	26 5 15.3	10.0	9.7 0.72	16	3 14	20 53 53.86	19 25 20.6	16.1	15.6 1.10
2	2 52	17 38 9.80	26 9 57.9	10.1	9.8 0.73	17	3 14	20 57 18.25	19 5 47.4	16.3	15.8 1.11
3	2 53	17 43 10.19	26 13 59.3	10.1	9.8 0.74	18	3 13	21 0 38.56	18 46 0.7	16.5	16.0 1.13
4	2 54	17 48 10.20	26 17 19.3	10.2	9.9 0.74	19	3 12	21 3 54.65	18 26 1.4	16.7	16.2 1.14
5	2 55	17 53 9.78	-26 19 58.0	10.3	10.0 0.75	20	3 12	21 7 6.42	-18 5 50.9	17.0	16.5 1.16
6	2 56	17 58 8.83	26 21 55.2	10.4	10.1 0.76	21	3 11	21 10 13.75	17 45 30.3	17.2	16.7 1.17
7	2 57	18 3 7.29	26 23 11.2	10.5	10.2 0.76	22	3 10	21 13 16.53	17 25 1.0	17.5	17.0 1.19
8	2 58	18 8 5.05	26 23 45.7	10.6	10.3 0.77	23	3 9	21 16 14.61	17 4 24.0	17.7	17.2 1.20
9	2 59	18 13 2.04	26 23 39.3	10.7	10.4 0.77	24	3 8	21 19 7.87	16 43 40.8	18.0	17.5 1.22
10	3 0	18 17 58.17	-26 22 51.8	10.8	10.5 0.78	25	3 7	21 21 56.19	-16 22 52.6	18.2	17.7 1.23
11	3 1	18 22 53.36	26 21 23.5	10.9	10.6 0.79	26	3 6	21 24 39.43	16 2 0.8	18.5	18.0 1.25
12	3 2	18 27 47.52	26 19 14.5	11.0	10.7 0.79	27	3 4	21 27 17.44	15 41 6.6	18.8	18.3 1.27
13	3 3	18 32 40.56	26 16 25.1	11.1	10.8 0.80	28	3 3	21 29 50.09	15 20 11.4	19.1	18.5 1.28
14	3 4	18 37 32.40	26 12 55.8	11.2	10.9 0.80	29	3 1	21 32 17.23	14 59 16.4	19.4	18.8 1.30
15	3 5	18 42 22.93	-26 8 46.8	11.3	11.0 0.81	30	3 0	21 34 38.73	-14 38 23.3	19.7	19.1 1.31
16	3 6	18 47 12.08	26 3 58.2	11.4	11.1 0.82	31	2 58	21 36 54.40	-14 17 33.4	20.0	19.4 1.33

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semi-diam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semi-diam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" " "	"	" s			h m	h m s	" " "	"	" s	
Sept. 30	20 19	8 57 58.99	+18 26 40.8	4.6	2.6	0.18	Nov. 15	18 59	10 39 21.99	+10 29 43.5	5.6	3.2	0.22
Oct. 1	20 18	9 0 24.95	18 17 21.9	4.6	2.6	0.19	16	18 57	10 41 18.96	10 19 8.2	5.7	3.2	0.22
2	20 16	9 2 50.33	18 7 58.0	4.6	2.6	0.19	17	18 55	10 43 15.20	10 8 34.8	5.7	3.3	0.22
3	20 15	9 5 15.14	17 58 29.3	4.6	2.6	0.19	18	18 53	10 45 10.73	9 58 3.3	5.7	3.3	0.22
4	20 13	9 7 39.38	17 48 56.0	4.6	2.7	0.19	19	18 51	10 47 5.51	9 47 34.1	5.8	3.3	0.22
5	20 12	9 10 3.03	+17 39 18.0	4.7	2.7	0.19	20	18 49	10 48 59.55	+ 9 37 7.1	5.8	3.3	0.22
6	20 10	9 12 26.09	17 29 35.8	4.7	2.7	0.19	21	18 47	10 50 52.83	9 26 42.6	5.8	3.3	0.23
7	20 8	9 14 48.57	17 19 49.3	4.7	2.7	0.19	22	18 45	10 52 45.37	9 16 20.7	5.9	3.4	0.23
8	20 7	9 17 10.45	17 9 58.8	4.7	2.7	0.19	23	18 43	10 54 37.13	9 6 1.6	5.9	3.4	0.23
9	20 5	9 19 31.74	17 0 4.3	4.7	2.7	0.19	24	18 41	10 56 28.15	8 55 45.2	5.9	3.4	0.23
10	20 4	9 21 52.44	+16 50 6.0	4.7	2.7	0.19	25	18 39	10 58 18.41	+ 8 45 32.0	6.0	3.4	0.23
11	20 2	9 24 12.52	16 40 4.2	4.8	2.7	0.19	26	18 37	11 0 7.88	8 35 21.9	6.0	3.4	0.23
12	20 0	9 26 32.01	16 29 58.8	4.8	2.7	0.19	27	18 35	11 1 56.58	8 25 15.0	6.0	3.5	0.23
13	19 59	9 28 50.90	16 19 50.1	4.8	2.8	0.19	28	18 33	11 3 44.48	8 15 11.8	6.1	3.5	0.23
14	19 57	9 31 9.18	16 9 38.4	4.8	2.8	0.19	29	18 30	11 5 31.57	8 5 12.0	6.1	3.5	0.24
15	19 56	9 33 26.84	+15 59 23.5	4.8	2.8	0.19	30	18 28	11 7 17.86	+ 7 55 16.0	6.2	3.5	0.24
16	19 54	9 35 43.87	15 49 5.8	4.9	2.8	0.19	Dec. 1	18 26	11 9 3.33	7 45 24.0	6.2	3.6	0.24
17	19 52	9 38 0.30	15 38 45.5	4.9	2.8	0.19	2	18 24	11 10 47.95	7 35 36.1	6.2	3.6	0.24
18	19 51	9 40 16.10	15 28 22.6	4.9	2.8	0.19	3	18 22	11 12 31.72	7 25 52.7	6.3	3.6	0.24
19	19 49	9 42 31.27	15 17 57.4	4.9	2.8	0.19	4	18 19	11 14 14.62	7 16 13.8	6.3	3.6	0.24
20	19 47	9 44 45.82	+15 7 29.8	4.9	2.8	0.20	5	18 17	11 15 56.64	+ 7 6 39.6	6.4	3.6	0.25
21	19 45	9 46 59.76	14 57 0.0	5.0	2.9	0.20	6	18 15	11 17 37.77	6 57 10.3	6.4	3.7	0.25
22	19 44	9 49 13.08	14 46 28.3	5.0	2.9	0.20	7	18 13	11 19 17.99	6 47 46.2	6.5	3.7	0.25
23	19 42	9 51 25.76	14 35 54.7	5.0	2.9	0.20	8	18 10	11 20 57.27	6 38 27.4	6.5	3.7	0.25
24	19 40	9 53 37.82	14 25 19.2	5.0	2.9	0.20	9	18 8	11 22 35.61	6 29 14.0	6.5	3.8	0.25
25	19 39	9 55 49.27	+14 14 42.1	5.1	2.9	0.20	10	18 6	11 24 12.98	+ 6 20 6.3	6.6	3.8	0.25
26	19 37	9 58 0.08	14 4 3.6	5.1	2.9	0.20	11	18 4	11 25 49.36	6 11 4.4	6.6	3.8	0.26
27	19 35	10 0 10.27	13 53 23.7	5.1	2.9	0.20	12	18 1	11 27 24.74	6 2 8.6	6.7	3.8	0.26
28	19 33	10 2 19.83	13 42 42.6	5.1	2.9	0.20	13	17 59	11 28 59.09	5 53 19.1	6.7	3.9	0.26
29	19 31	10 4 28.79	13 32 0.4	5.1	2.9	0.20	14	17 56	11 30 32.41	5 44 36.0	6.8	3.9	0.26
30	19 30	10 6 37.12	+13 21 17.2	5.2	3.0	0.20	15	17 54	11 32 4.66	+ 5 35 59.5	6.8	3.9	0.26
31	19 28	10 8 44.81	13 10 33.2	5.2	3.0	0.20	16	17 52	11 33 35.84	5 27 29.8	6.9	3.9	0.26
Nov. 1	19 26	10 10 51.89	12 59 48.6	5.2	3.0	0.20	17	17 49	11 35 5.92	5 19 6.9	6.9	4.0	0.27
2	19 24	10 12 58.33	12 49 3.5	5.3	3.0	0.21	18	17 47	11 36 34.88	5 10 51.3	7.0	4.0	0.27
3	19 22	10 15 4.14	12 38 18.0	5.3	3.0	0.21	19	17 44	11 38 2.72	5 2 43.0	7.0	4.0	0.27
4	19 20	10 17 9.30	+12 27 32.2	5.3	3.0	0.21	20	17 42	11 39 29.40	+ 4 54 42.0	7.1	4.1	0.27
5	19 19	10 19 13.81	12 16 46.5	5.3	3.1	0.21	21	17 39	11 40 54.92	4 46 48.7	7.2	4.1	0.27
6	19 17	10 21 17.68	12 6 0.8	5.4	3.1	0.21	22	17 37	11 42 19.26	4 39 3.2	7.2	4.1	0.28
7	19 15	10 23 20.88	11 55 15.5	5.4	3.1	0.21	23	17 34	11 43 42.39	4 31 25.7	7.3	4.2	0.28
8	19 13	10 25 23.41	11 44 30.7	5.4	3.1	0.21	24	17 32	11 45 4.29	4 23 56.3	7.3	4.2	0.28
9	19 11	10 27 25.28	+11 33 46.6	5.4	3.1	0.21	25	17 29	11 46 24.94	+ 4 16 35.1	7.4	4.2	0.28
10	19 9	10 29 26.47	11 23 3.1	5.5	3.1	0.21	26	17 26	11 47 44.32	4 9 22.5	7.4	4.3	0.29
11	19 7	10 31 26.98	11 12 20.6	5.5	3.2	0.21	27	17 24	11 49 2.40	4 2 18.6	7.5	4.3	0.29
12	19 5	10 33 26.78	11 1 39.3	5.5	3.2	0.22	28	17 21	11 50 19.16	3 55 23.7	7.6	4.3	0.29
13	19 3	10 35 25.89	10 50 59.2	5.6	3.2	0.22	29	17 18	11 51 34.55	3 48 38.0	7.6	4.4	0.29
14	19 1	10 37 24.29	+10 40 20.6	5.6	3.2	0.22	30	17 16	11 52 48.57	+ 3 42 1.8	7.7	4.4	0.29
15/18 59	10 39 21.99	+10 29 43.5	5.6	3.2	0.22		31	17 13	11 54 1.17	+ 3 35 35.2	7.7	4.4	0.30

Stellar magnitude at opposition in March, 1918, -1.1.

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.
n.	h m s	h m s	° ' "	"	" s			h m s	h m s	° ' "	"	" s	
1	6 53	1 37 2.41	+ 8 45 51.2	1.9	20.3	1.46	Aug. 17	18 43	4 28 6.59	+20 54 14.9	1.7	18.2	1.39
2	6 49	1 37 11.70	8 47 4.7	1.9	20.3	1.46	18	18 40	4 28 38.52	20 55 21.4	1.7	18.3	1.39
3	6 45	1 37 21.75	8 48 22.5	1.9	20.2	1.45	19	18 36	4 29 9.84	20 56 26.0	1.7	18.3	1.39
4	6 42	1 37 32.55	8 49 44.4	1.9	20.1	1.45	20	18 33	4 29 40.56	20 57 28.9	1.7	18.4	1.40
5	6 38	1 37 44.08	8 51 10.6	1.9	20.1	1.44	21	18 29	4 30 10.67	20 58 30.0	1.7	18.4	1.40
6	6 34	1 37 56.35	+ 8 52 41.1	1.9	20.0	1.44	22	18 26	4 30 40.14	+20 59 29.5	1.7	18.5	1.41
7	6 30	1 38 9.35	8 54 15.6	1.9	19.9	1.43	23	18 22	4 31 8.99	21 0 27.2	1.7	18.5	1.41
8	6 27	1 38 23.08	8 55 54.0	1.9	19.9	1.43	24	18 19	4 31 37.20	21 1 23.1	1.7	18.6	1.41
9	6 23	1 38 37.53	8 57 36.6	1.8	19.8	1.42	25	18 15	4 32 4.76	21 2 17.4	1.7	18.6	1.42
10	6 19	1 38 52.71	8 59 23.1	1.8	19.7	1.42	26	18 12	4 32 31.68	21 3 10.0	1.8	18.7	1.42
11	6 16	1 39 8.59	+ 9 1 13.6	1.8	19.7	1.41	27	18 9	4 32 57.93	+21 4 0.8	1.8	18.8	1.43
12	6 12	1 39 25.18	9 3 7.9	1.8	19.6	1.41	28	18 5	4 33 23.52	21 4 50.1	1.8	18.8	1.43
13	6 8	1 39 42.47	9 5 6.1	1.8	19.5	1.40	29	18 2	4 33 48.43	21 5 57.5	1.8	18.9	1.44
14	6 5	1 40 0.46	9 7 8.1	1.8	19.5	1.40	30	17 58	4 34 12.66	21 6 23.4	1.8	18.9	1.44
15	6 1	1 40 19.12	9 9 19.9	1.8	19.4	1.40	31	17 54	4 34 36.21	21 7 7.5	1.8	19.0	1.45
16	5 57	1 40 38.49	+ 9 11 23.4	1.8	19.3	1.39	Sept. 1	17 51	4 34 59.05	+21 7 49.9	1.8	19.1	1.45
17	5 54	1 40 58.53	9 13 36.5	1.8	19.3	1.39	2	17 47	4 35 21.20	21 8 30.7	1.8	19.1	1.45
18	5 50	1 41 19.25	9 15 53.4	1.8	19.2	1.38	3	17 44	4 35 42.65	21 9 9.9	1.8	19.2	1.46
19	5 47	1 41 40.63	9 18 13.9	1.8	19.2	1.38	4	17 40	4 36 3.37	21 9 47.4	1.8	19.2	1.46
20	5 43	1 42 2.68	9 20 37.8	1.8	19.1	1.37	5	17 36	4 36 23.38	21 10 23.3	1.8	19.3	1.47
21	5 40	1 42 25.38	+ 9 23 5.3	1.8	19.0	1.37	6	17 33	4 36 42.64	+21 10 57.5	1.8	19.4	1.47
22	5 36	1 42 48.73	9 25 36.3	1.8	19.0	1.36	7	17 29	4 37 1.16	21 11 30.1	1.8	19.4	1.48
23	5 33	1 43 12.74	9 28 10.6	1.8	18.9	1.36	8	17 26	4 37 18.93	21 12 1.1	1.8	19.5	1.48
24	5 29	1 43 37.38	9 30 48.3	1.8	18.8	1.35	9	17 22	4 37 35.95	21 12 30.3	1.8	19.5	1.49
25	5 26	1 44 2.86	9 33 29.3	1.8	18.8	1.35	10	17 18	4 37 52.19	21 12 58.1	1.8	19.6	1.49
26	5 22	1 44 28.57	+ 9 36 13.5	1.8	18.7	1.35	11	17 15	4 38 7.67	+21 13 24.1	1.8	19.7	1.49
27	5 19	1 44 55.09	9 39 1.0	1.7	18.7	1.35	12	17 11	4 38 22.36	21 13 48.6	1.8	19.7	1.50
28	5 15	1 45 22.22	9 41 51.4	1.7	18.6	1.34	13	17 7	4 38 36.26	21 14 11.5	1.8	19.8	1.50
29	5 12	1 45 49.94	9 44 44.9	1.7	18.5	1.34	14	17 4	4 38 49.37	21 14 32.6	1.9	19.8	1.51
30	5 8	1 46 18.26	9 47 41.5	1.7	18.5	1.33	15	17 0	4 39 1.68	21 14 52.3	1.9	19.9	1.51
31	5 5	1 46 47.16	+ 9 50 41.0	1.7	18.4	1.33	16	16 56	4 39 13.18	+21 15 10.3	1.9	20.0	1.52
eb. 1	5 1	1 47 16.65	9 53 43.4	1.7	18.4	1.33	17	16 52	4 39 23.88	21 15 26.8	1.9	20.0	1.52
2	4 58	1 47 46.69	9 56 48.5	1.7	18.3	1.32	18	16 49	4 39 33.77	21 15 41.5	1.9	20.1	1.53
3	4 54	1 48 17.31	9 59 56.4	1.7	18.3	1.32	19	16 45	4 39 42.83	21 15 54.8	1.9	20.2	1.53
4	4 51	1 48 48.49	10 3 7.1	1.7	18.2	1.32	20	16 41	4 39 51.07	21 16 6.5	1.9	20.2	1.54
5	4 48	1 49 20.21	+10 6 20.4	1.7	18.2	1.31	21	16 37	4 39 58.49	+21 16 16.6	1.9	20.3	1.54
6	4 44	1 49 52.48	10 9 36.3	1.7	18.1	1.31	22	16 33	4 40 5.08	21 16 25.1	1.9	20.4	1.55
7	4 41	1 50 25.27	10 12 54.8	1.7	18.1	1.30	23	16 30	4 40 10.83	21 16 32.1	1.9	20.4	1.55
8	4 37	1 50 58.59	10 16 15.7	1.7	18.0	1.30	24	16 26	4 40 15.75	21 16 37.4	1.9	20.5	1.56
9	4 34	1 51 32.45	10 19 39.1	1.7	17.9	1.29	25	16 22	4 40 19.82	21 16 41.2	1.9	20.5	1.56
10	4 31	1 52 6.82	+10 23 4.9	1.7	17.9	1.29	26	16 18	4 40 23.06	+21 16 43.5	1.9	20.6	1.57
11	4 27	1 52 41.70	10 26 33.0	1.7	17.8	1.29	27	16 14	4 40 25.45	21 16 44.2	1.9	20.7	1.57
12	4 24	1 53 17.07	10 30 3.5	1.7	17.8	1.29	28	16 10	4 40 27.00	21 16 43.3	1.9	20.7	1.58
13	4 20	1 53 52.95	10 33 36.2	1.7	17.8	1.29	29	16 6	4 40 27.71	21 16 40.8	1.9	20.8	1.59
14	4 17	1 54 29.31	10 37 11.2	1.7	17.7	1.28	30	16 2	4 40 27.58	21 16 36.8	2.0	20.9	1.60
ug. 16	18 46	4 27 34.07	+20 53 6.8	1.7	18.2	1.38	Oct. 1	15 58	4 40 26.58	+21 16 31.3	2.0	20.9	1.60
17	18 43	4 28 6.59	+20 54 14.9	1.7	18.2	1.39	2	15 54	4 40 24.75	+21 16 24.2	2.0	21.0	1.61

Stellar magnitude at opposition in November, 1917, —2A.

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam.	S. T. of Sem. Pass. Mer.
	h m s	° ' "	"	"	"	s		h m s	° ' "	"	"	"	s
Oct. 1	15 58	4 40 26.58	+21 16 31.3	2.0	20.9	1.60	Nov. 15	12 47	4 26 16.32	+20 46 46.6	2.2	23.1	1.75
2	15 54	4 40 24.75	21 16 24.2	2.0	21.0	1.61	16	12 43	4 25 43.74	20 45 37.7	2.2	23.1	1.75
3	15 50	4 40 22.06	21 16 15.5	2.0	21.1	1.61	17	12 38	4 25 10.87	20 44 27.9	2.2	23.1	1.75
4	15 46	4 40 18.52	21 16 5.3	2.0	21.1	1.61	18	12 34	4 24 37.73	20 43 17.4	2.2	23.1	1.76
5	15 42	4 40 14.13	21 15 53.6	2.0	21.2	1.62	19	12 29	4 24 4.34	20 42 6.1	2.2	23.1	1.76
6	15 38	4 40 8.88	+21 15 40.2	2.0	21.2	1.62	20	12 25	4 23 30.73	+20 40 54.2	2.2	23.2	1.76
7	15 34	4 40 2.77	21 15 25.3	2.0	21.3	1.63	21	12 20	4 22 56.93	20 39 41.5	2.2	23.2	1.76
8	15 30	4 39 55.82	21 15 8.9	2.0	21.4	1.63	22	12 16	4 22 22.97	20 38 28.4	2.2	23.2	1.76
9	15 26	4 39 48.01	21 14 50.8	2.0	21.4	1.63	23	12 11	4 21 48.86	20 37 14.7	2.2	23.2	1.76
10	15 22	4 39 39.35	21 14 31.3	2.0	21.5	1.64	24	12 7	4 21 14.64	20 36 0.5	2.2	23.2	1.76
11	15 18	4 39 29.83	+21 14 10.2	2.0	21.5	1.64	25	12 2	4 20 40.33	+20 34 45.9	2.2	23.2	1.76
12	15 14	4 39 19.49	21 13 47.5	2.0	21.6	1.65	26	11 58	4 20 5.96	20 33 30.9	2.2	23.2	1.76
13	15 10	4 39 8.31	21 13 23.4	2.0	21.7	1.65	27	11 53	4 19 31.57	20 32 15.7	2.2	23.2	1.76
14	15 6	4 38 56.29	21 12 57.7	2.0	21.7	1.66	28	11 49	4 18 57.13	20 31 0.1	2.2	23.2	1.76
15	15 2	4 38 43.44	21 12 30.4	2.0	21.8	1.66	29	11 44	4 18 22.73	20 29 44.5	2.2	23.2	1.76
16	14 58	4 38 29.78	+21 12 1.6	2.0	21.8	1.66	30	11 40	4 17 48.36	+20 28 28.7	2.2	23.2	1.76
17	14 53	4 38 15.30	21 11 31.4	2.0	21.9	1.67	Dec. 1	11 35	4 17 14.06	20 27 12.9	2.2	23.2	1.75
18	14 49	4 38 0.02	21 10 59.7	2.0	21.9	1.67	2	11 31	4 16 39.85	20 25 57.1	2.2	23.2	1.75
19	14 45	4 37 43.93	21 10 26.5	2.1	22.0	1.68	3	11 26	4 16 5.75	20 24 41.4	2.2	23.2	1.75
20	14 41	4 37 27.07	21 9 51.6	2.1	22.1	1.68	4	11 22	4 15 31.80	20 23 25.8	2.2	23.1	1.75
21	14 37	4 37 9.43	+21 9 15.3	2.1	22.1	1.68	5	11 17	4 14 58.01	+20 22 10.4	2.2	23.1	1.75
22	14 32	4 36 51.03	21 8 37.5	2.1	22.2	1.69	6	11 13	4 14 24.41	20 20 55.4	2.2	23.1	1.75
23	14 28	4 36 31.88	21 7 58.3	2.1	22.2	1.69	7	11 8	4 13 51.03	20 19 40.5	2.2	23.1	1.75
24	14 24	4 36 11.98	21 7 17.6	2.1	22.3	1.70	8	11 4	4 13 17.89	20 18 26.2	2.2	23.1	1.75
25	14 20	4 35 51.36	21 6 35.6	2.1	22.3	1.70	9	10 59	4 12 45.02	20 17 12.4	2.2	23.1	1.75
26	14 15	4 35 30.01	+21 5 52.0	2.1	22.4	1.70	10	10 55	4 12 12.45	+20 15 59.2	2.2	23.0	1.74
27	14 11	4 35 7.98	21 5 7.1	2.1	22.4	1.71	11	10 51	4 11 40.19	20 14 46.7	2.2	23.0	1.74
28	14 7	4 34 45.25	21 4 20.6	2.1	22.5	1.71	12	10 46	4 11 8.29	20 13 34.8	2.2	23.0	1.74
29	14 2	4 34 21.85	21 3 32.7	2.1	22.5	1.71	13	10 42	4 10 36.77	20 12 23.6	2.2	23.0	1.74
30	13 58	4 33 57.78	21 2 43.6	2.1	22.5	1.71	14	10 37	4 10 5.62	20 11 13.5	2.1	22.9	1.73
31	13 54	4 33 33.06	+21 1 53.1	2.1	22.6	1.72	15	10 33	4 9 34.90	+20 10 4.3	2.1	22.9	1.73
Nov. 1	13 49	4 33 7.70	21 1 1.2	2.1	22.6	1.72	16	10 28	4 9 4.63	20 8 56.0	2.1	22.9	1.73
2	13 45	4 32 41.74	21 0 8.0	2.1	22.7	1.72	17	10 24	4 8 34.82	20 7 48.8	2.1	22.8	1.73
3	13 40	4 32 15.16	20 59 3.5	2.1	22.7	1.73	18	10 19	4 8 5.51	20 6 42.6	2.1	22.8	1.72
4	13 36	4 31 48.01	20 58 17.8	2.1	22.7	1.73	19	10 15	4 7 36.69	20 5 37.8	2.1	22.8	1.72
5	13 32	4 31 20.29	+20 57 20.8	2.1	22.8	1.73	20	10 11	4 7 8.42	+20 4 34.3	2.1	22.7	1.72
6	13 27	4 30 52.02	20 56 22.5	2.1	22.8	1.74	21	10 6	4 6 40.68	20 3 32.0	2.1	22.7	1.71
7	13 23	4 30 23.21	20 55 22.9	2.1	22.8	1.74	22	10 2	4 6 13.52	20 2 31.2	2.1	22.6	1.71
8	13 18	4 29 53.91	20 54 22.2	2.1	22.9	1.74	23	9 57	4 5 46.94	20 1 31.8	2.1	22.6	1.71
9	13 14	4 29 24.11	20 53 20.3	2.1	22.9	1.74	24	9 53	4 5 20.96	20 0 33.9	2.1	22.5	1.71
10	13 10	4 28 53.85	+20 52 17.2	2.1	22.9	1.74	25	9 49	4 4 55.59	+19 59 37.6	2.1	22.5	1.70
11	13 5	4 28 23.14	20 51 13.0	2.2	23.0	1.74	26	9 44	4 4 30.85	19 58 42.8	2.1	22.5	1.70
12	13 1	4 27 52.00	20 50 7.9	2.2	23.0	1.75	27	9 40	4 4 6.76	19 57 49.9	2.1	22.4	1.69
13	12 56	4 27 20.48	20 49 1.7	2.2	23.0	1.75	28	9 36	4 3 43.33	19 56 58.7	2.1	22.4	1.69
14	12 52	4 26 48.57	20 47 54.6	2.2	23.0	1.75	29	9 32	4 3 20.59	19 56 9.3	2.1	22.3	1.69
15	12 47	4 26 16.32	+20 46 46.6	2.2	23.1	1.75	30	9 27	4 2 58.53	+19 55 21.7	2.1	22.3	1.68
16/12 43	4 25 43.74	+20 45 37.7	2.2	23.1	1.75		31	9 23	4 2 37.17	+19 54 35.9	2.1	22.2	1.68

Stellar magnitude at opposition in November, 1917, -2.4.

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam. S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam. S. T. of Sem. Pass. Mer.
	h m s	h m s	° ' "	"	" s		h m s	h m s	° ' "	"	" s
Jan. 0	13 21 8	2 29.61	+20 38 45.0	1.1	9.5 0.74	Feb. 15	10 6 7	47 37.99	+21 24 12.4	1.1	9.4 0.74
1	13 17 8	2 10.59	20 39 47.1	1.1	9.5 0.74	16	10 1 7	47 22.29	21 24 58.0	1.1	9.4 0.74
2	13 13 8	1 51.40	20 40 49.7	1.1	9.5 0.75	17	9 57 7	47 6.92	21 25 42.7	1.1	9.4 0.74
3	13 8 8	1 32.03	20 41 52.5	1.1	9.6 0.75	18	9 53 7	46 51.87	21 26 26.3	1.1	9.4 0.74
4	13 4 8	1 12.51	20 42 55.6	1.1	9.6 0.75	19	9 49 7	46 37.15	21 27 9.0	1.1	9.4 0.74
5	13 0 8	0 52.83	+20 43 59.1	1.1	9.6 0.75	20	9 45 7	46 22.79	+21 27 50.6	1.1	9.4 0.74
6	12 56 8	0 33.01	20 45 2.7	1.1	9.6 0.75	21	9 40 7	46 8.77	21 28 31.2	1.1	9.4 0.74
7	12 51 8	0 13.05	20 46 6.6	1.1	9.6 0.75	22	9 36 7	45 55.11	21 29 10.9	1.1	9.4 0.73
8	12 47 7	59 52.98	20 47 10.5	1.1	9.6 0.75	23	9 32 7	45 41.83	21 29 49.5	1.1	9.3 0.73
9	12 43 7	59 32.81	20 48 14.6	1.1	9.6 0.75	24	9 28 7	45 28.92	21 30 27.0	1.1	9.3 0.73
10	12 39 7	59 12.54	+20 49 18.8	1.1	9.6 0.75	25	9 24 7	45 16.39	+21 31 3.5	1.1	9.3 0.73
11	12 34 7	58 52.19	20 50 23.2	1.1	9.6 0.75	26	9 20 7	45 4.25	21 31 39.0	1.1	9.3 0.73
12	12 30 7	58 31.75	20 51 27.5	1.1	9.6 0.75	27	9 16 7	44 52.51	21 32 13.2	1.1	9.3 0.73
13	12 26 7	58 11.26	20 52 31.8	1.1	9.6 0.75	28	9 11 7	44 41.16	21 32 46.4	1.1	9.3 0.73
14	12 21 7	57 50.72	20 53 35.9	1.1	9.6 0.75	Mar. 1	9 7 7	44 30.22	21 33 18.5	1.1	9.3 0.73
15	12 17 7	57 30.13	+20 54 40.1	1.1	9.6 0.75	2	9 3 7	44 19.68	+21 33 49.4	1.1	9.2 0.73
16	12 13 7	57 9.53	20 55 44.2	1.1	9.6 0.75	3	8 59 7	44 9.57	21 34 19.3	1.1	9.2 0.73
17	12 9 7	56 48.91	20 56 48.1	1.1	9.6 0.75	4	8 55 7	43 59.87	21 34 48.0	1.0	9.2 0.73
18	12 4 7	56 28.28	20 57 51.7	1.1	9.6 0.75	5	8 51 7	43 50.59	21 35 15.7	1.0	9.2 0.72
19	12 0 7	56 7.66	20 58 55.2	1.1	9.6 0.75	6	8 47 7	43 41.74	21 35 42.3	1.0	9.2 0.72
20	11 56 7	55 47.06	+20 59 58.4	1.1	9.6 0.75	7	8 43 7	43 33.34	+21 36 7.7	1.0	9.2 0.72
21	11 52 7	55 26.50	21 1 1.3	1.1	9.6 0.75	8	8 39 7	43 25.35	21 36 32.0	1.0	9.2 0.72
22	11 47 7	55 5.99	21 2 4.0	1.1	9.6 0.75	9	8 35 7	43 17.80	21 36 55.1	1.0	9.2 0.72
23	11 43 7	54 45.54	21 3 6.3	1.1	9.6 0.75	10	8 31 7	43 10.69	21 37 17.2	1.0	9.1 0.72
24	11 39 7	54 25.15	21 4 8.1	1.1	9.6 0.75	11	8 27 7	43 4.03	21 37 38.1	1.0	9.1 0.72
25	11 34 7	54 4.85	+21 5 9.5	1.1	9.6 0.75	12	8 23 7	42 57.81	+21 37 57.8	1.0	9.1 0.72
26	11 30 7	53 44.65	21 6 10.5	1.1	9.6 0.75	13	8 18 7	42 52.04	21 38 16.5	1.0	9.1 0.71
27	11 26 7	53 24.56	21 7 11.0	1.1	9.6 0.75	14	8 14 7	42 46.72	21 38 33.9	1.0	9.1 0.71
28	11 22 7	53 4.60	21 8 10.9	1.1	9.6 0.75	15	8 10 7	42 41.86	21 38 50.2	1.0	9.1 0.71
29	11 17 7	52 44.76	21 9 10.3	1.1	9.6 0.75	16	8 6 7	42 37.46	21 39 5.3	1.0	9.0 0.71
30	11 13 7	52 25.07	+21 10 9.1	1.1	9.6 0.75	17	8 2 7	42 33.50	+21 39 19.4	1.0	9.0 0.71
31	11 9 7	52 5.52	21 11 7.3	1.1	9.6 0.75	18	7 58 7	42 30.01	21 39 32.1	1.0	9.0 0.71
Feb. 1	11 5 7	51 46.16	21 12 4.9	1.1	9.6 0.75	19	7 54 7	42 26.99	21 39 43.8	1.0	9.0 0.71
2	11 0 7	51 26.96	21 13 1.7	1.1	9.6 0.75	20	7 51 7	42 24.43	21 39 54.4	1.0	9.0 0.71
3	10 56 7	51 7.95	21 13 58.0	1.1	9.5 0.75	21	7 47 7	42 22.34	21 40 3.7	1.0	9.0 0.71
4	10 52 7	50 49.14	+21 14 53.5	1.1	9.5 0.75	22	7 43 7	42 20.71	+21 40 11.8	1.0	9.0 0.70
5	10 48 7	50 30.53	21 15 48.4	1.1	9.5 0.75	23	7 39 7	42 19.56	21 40 18.8	1.0	8.9 0.70
6	10 43 7	50 12.14	21 16 42.5	1.1	9.5 0.75	24	7 35 7	42 18.88	21 40 24.6	1.0	8.9 0.70
7	10 39 7	49 53.98	21 17 35.7	1.1	9.5 0.74	25	7 31 7	42 18.67	21 40 29.2	1.0	8.9 0.70
8	10 35 7	49 36.05	21 18 28.3	1.1	9.5 0.74	26	7 27 7	42 18.93	21 40 32.6	1.0	8.9 0.70
9	10 31 7	49 18.38	+21 19 20.0	1.1	9.5 0.74	27	7 23 7	42 19.66	+21 40 34.9	1.0	8.9 0.70
10	10 27 7	49 0.95	21 20 10.8	1.1	9.5 0.74	28	7 19 7	42 20.86	21 40 36.0	1.0	8.9 0.70
11	10 22 7	48 43.80	21 21 0.9	1.1	9.5 0.74	29	7 15 7	42 22.53	21 40 36.0	1.0	8.8 0.69
12	10 18 7	48 26.91	21 21 50.1	1.1	9.5 0.74	30	7 11 7	42 24.66	21 40 34.7	1.0	8.8 0.69
13	10 14 7	48 10.31	21 22 38.5	1.1	9.5 0.74	31	7 7 7	42 27.26	21 40 32.4	1.0	8.8 0.69
14	10 10 7	47 54.00	+21 23 25.9	1.1	9.5 0.74	Apr. 1	7 3 7	42 30.33	+21 40 28.8	1.0	8.8 0.69
15	10 6 7	47 37.99	+21 24 12.4	1.1	9.4 0.74	2	7 0 7	42 33.85	+21 40 24.1	1.0	8.8 0.68



## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam. S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Polar Semidiam. S. T. of Sem. Pass. Mer.
	h m s	h m s	" " "	"	" s		h m s	h m s	" " "	"	" s
Apr. 1	7 3	7 42 30.33	+21 40 28.8	1.0	8.8 0.69	Nov. 15	17 29	9 8 30.07	+17 8 50.3	1.0	8.7 0.67
2	7 0	7 42 33.85	21 40 24.1	1.0	8.8 0.69	16	17 25	9 8 34.42	17 8 41.9	1.0	8.7 0.67
3	6 56	7 42 37.84	21 40 18.2	1.0	8.8 0.69	17	17 21	9 8 38.34	17 8 35.4	1.0	8.7 0.67
4	6 52	7 42 42.29	21 40 11.2	1.0	8.8 0.69	18	17 17	9 8 41.80	17 8 30.8	1.0	8.7 0.67
5	6 48	7 42 47.19	21 40 3.1	1.0	8.7 0.68	19	17 13	9 8 44.83	17 8 28.2	1.0	8.8 0.67
6	6 44	7 42 52.55	+21 39 53.8	1.0	8.7 0.68	20	17 9	9 8 47.40	+17 8 27.6	1.0	8.8 0.67
7	6 40	7 42 58.36	21 39 43.4	1.0	8.7 0.68	21	17 5	9 8 49.53	17 8 29.1	1.0	8.8 0.67
8	6 37	7 43 4.63	21 39 31.7	1.0	8.7 0.68	22	17 2	9 8 51.21	17 8 32.4	1.0	8.8 0.67
9	6 33	7 43 11.34	21 39 19.0	1.0	8.7 0.68	23	16 58	9 8 52.45	17 8 37.8	1.0	8.8 0.67
10	6 29	7 43 18.50	21 39 5.2	1.0	8.6 0.68	24	16 54	9 8 53.23	17 8 45.1	1.0	8.8 0.68
11	6 25	7 43 26.10	+21 38 50.2	1.0	8.6 0.68	25	16 50	9 8 53.57	+17 8 54.4	1.0	8.9 0.68
12	6 21	7 43 34.16	21 38 34.2	1.0	8.6 0.68	26	16 46	9 8 53.45	17 9 5.6	1.0	8.9 0.68
13	6 17	7 43 42.64	21 38 17.0	1.0	8.6 0.68	27	16 42	9 8 52.89	17 9 18.8	1.0	8.9 0.68
14	6 14	7 43 51.57	21 37 58.8	1.0	8.6 0.67	28	16 38	9 8 51.89	17 9 33.9	1.0	8.9 0.68
15	6 10	7 44 0.94	21 37 39.4	1.0	8.6 0.67	29	16 34	9 8 50.44	17 9 51.0	1.0	8.9 0.68
16	6 6	7 44 10.75	+21 37 18.8	1.0	8.6 0.67	30	16 30	9 8 48.55	+17 10 10.0	1.0	8.9 0.68
17	6 2	7 44 20.98	21 36 57.1	1.0	8.5 0.67	Dec. 1	16 26	9 8 46.20	17 10 31.0	1.0	8.9 0.68
18	5 59	7 44 31.64	21 36 34.2	1.0	8.5 0.67	2	16 22	9 8 43.42	17 10 53.9	1.0	9.0 0.68
19	5 55	7 44 42.73	21 36 10.3	1.0	8.5 0.67	3	16 18	9 8 40.18	17 11 18.8	1.0	9.0 0.69
20	5 51	7 44 54.25	21 35 45.2	1.0	8.5 0.67	4	16 14	9 8 36.51	17 11 45.6	1.0	9.0 0.69
Oct. 20	19 7 9	4 7.28	+17 23 24.1	0.9	8.3 0.64	5	16 10	9 8 32.39	+17 12 14.3	1.0	9.0 0.69
21	19 3	4 22.40	17 22 28.9	0.9	8.3 0.64	6	16 6	9 8 27.84	17 12 44.9	1.0	9.0 0.69
22	18 59	4 37.14	17 21 35.4	0.9	8.3 0.64	7	16 2	9 8 22.84	17 13 17.4	1.0	9.0 0.69
23	18 56	4 51.51	17 20 43.3	0.9	8.3 0.64	8	15 58	9 8 17.41	17 13 51.8	1.0	9.1 0.69
24	18 52	5 5.49	17 19 53.0	0.9	8.4 0.64	9	15 54	9 8 11.55	17 14 28.1	1.0	9.1 0.69
25	18 48	5 19.09	+17 19 4.3	1.0	8.4 0.64	10	15 50	9 8 5.25	+17 15 6.3	1.0	9.1 0.70
26	18 45	5 32.30	17 18 17.3	1.0	8.4 0.64	11	15 46	9 7 58.53	17 15 46.3	1.0	9.1 0.70
27	18 41	5 45.11	17 17 31.8	1.0	8.4 0.64	12	15 42	9 7 51.37	17 16 28.1	1.0	9.1 0.70
28	18 37	5 57.52	17 16 48.1	1.0	8.4 0.64	13	15 38	9 7 43.80	17 17 11.8	1.0	9.1 0.70
29	18 33	6 9.54	17 16 6.2	1.0	8.4 0.64	14	15 34	9 7 35.81	17 17 57.1	1.0	9.1 0.70
30	18 30	6 21.15	+17 15 25.9	1.0	8.4 0.65	15	15 30	9 7 27.40	+17 18 44.2	1.0	9.2 0.70
31	18 26	6 32.37	17 14 47.4	1.0	8.5 0.65	16	15 26	9 7 18.58	17 19 33.1	1.0	9.2 0.70
Nov. 1	18 22	6 43.18	17 14 10.6	1.0	8.5 0.65	17	15 22	9 7 9.35	17 20 23.5	1.0	9.2 0.70
2	18 18	6 53.58	17 13 35.7	1.0	8.5 0.65	18	15 18	9 6 59.73	17 21 15.7	1.0	9.2 0.70
3	18 15	7 3.56	17 13 2.4	1.0	8.5 0.65	19	15 13	9 6 49.70	17 22 9.4	1.0	9.2 0.70
4	18 11	7 13.13	+17 12 31.1	1.0	8.5 0.65	20	15 9	9 6 39.29	+17 23 4.9	1.0	9.2 0.71
5	18 7	7 22.28	17 12 1.5	1.0	8.5 0.65	21	15 5	9 6 28.49	17 24 1.9	1.0	9.2 0.71
6	18 3	7 31.00	17 11 33.8	1.0	8.6 0.65	22	15 1	9 6 17.32	17 25 0.4	1.0	9.2 0.71
7	17 59	7 39.30	17 11 8.0	1.0	8.6 0.66	23	14 57	9 6 5.77	17 26 0.5	1.1	9.3 0.71
8	17 56	7 47.17	17 10 44.1	1.0	8.6 0.66	24	14 53	9 5 53.86	17 27 2.0	1.1	9.3 0.71
9	17 52	7 54.61	+17 10 22.0	1.0	8.6 0.66	25	14 49	9 5 41.59	+17 28 4.9	1.1	9.3 0.71
10	17 48	8 1.61	17 10 1.9	1.0	8.6 0.66	26	14 45	9 5 28.97	17 29 9.3	1.1	9.3 0.71
11	17 44	8 8.18	17 9 43.7	1.0	8.6 0.66	27	14 40	9 5 15.99	17 30 15.0	1.1	9.3 0.71
12	17 40	8 14.32	17 9 27.5	1.0	8.6 0.66	28	14 36	9 5 2.68	17 31 22.0	1.1	9.3 0.71
13	17 36	8 20.01	17 9 13.1	1.0	8.7 0.66	29	14 32	9 4 49.02	17 32 30.5	1.1	9.3 0.71
14	17 33	8 25.27	+17 9 0.7	1.0	8.7 0.66	30	14 28	9 4 35.05	+17 33 40.1	1.1	9.3 0.72
15	17 29	8 30.07	+17 8 50.3	1.0	8.7 0.67	31	14 24	9 4 20.74	+17 34 51.0	1.1	9.4 0.72

Stellar magnitude at opposition in January, 1917, -0.1.

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" "	"	" "	s		h m	h m s	" "	"	" "	s
June 6	16 44	21 45 1.52	-14 19 8.6	0.4	1.7	0.12	July 22	13 39	21 40 54.36	-14 41 26.5	0.5	1.8	0.12
7	16 40	21 44 59.76	14 19 20.0	0.4	1.7	0.12	23	13 35	21 40 46.00	14 42 9.6	0.5	1.8	0.12
8	16 36	21 44 57.82	14 19 32.3	0.5	1.7	0.12	24	13 31	21 40 37.57	14 42 53.0	0.5	1.8	0.12
9	16 32	21 44 55.69	14 19 45.5	0.5	1.7	0.12	25	13 27	21 40 29.04	14 43 36.8	0.5	1.8	0.12
10	16 28	21 44 53.38	14 19 59.6	0.5	1.7	0.12	26	13 23	21 40 20.45	14 44 21.0	0.5	1.8	0.12
11	16 24	21 44 50.89	-14 20 14.6	0.5	1.7	0.12	27	13 19	21 40 11.78	-14 45 5.3	0.5	1.8	0.12
12	16 20	21 44 48.23	14 20 30.5	0.5	1.7	0.12	28	13 15	21 40 3.04	14 45 50.0	0.5	1.8	0.12
13	16 16	21 44 45.39	14 20 47.3	0.5	1.7	0.12	29	13 10	21 39 54.24	14 46 34.9	0.5	1.8	0.12
14	16 12	21 44 42.36	14 21 5.0	0.5	1.7	0.12	30	13 6	21 39 45.39	14 47 20.2	0.5	1.8	0.12
15	16 8	21 44 39.16	14 21 23.6	0.5	1.7	0.12	31	13 2	21 39 36.48	14 48 5.5	0.5	1.8	0.12
16	16 4	21 44 35.79	-14 21 43.1	0.5	1.7	0.12	Aug. 1	12 58	21 39 27.51	-14 48 51.1	0.5	1.8	0.12
17	16 0	21 44 32.24	14 22 3.4	0.5	1.7	0.12	2	12 54	21 39 18.48	14 49 36.8	0.5	1.8	0.12
18	15 56	21 44 28.52	14 22 24.5	0.5	1.7	0.12	3	12 50	21 39 9.42	14 50 22.6	0.5	1.8	0.12
19	15 52	21 44 24.63	14 22 46.5	0.5	1.7	0.12	4	12 46	21 39 0.31	14 51 8.8	0.5	1.8	0.12
20	15 48	21 44 20.57	14 23 9.3	0.5	1.7	0.12	5	12 42	21 38 51.16	14 51 55.0	0.5	1.8	0.12
21	15 44	21 44 16.34	-14 23 33.0	0.5	1.7	0.12	6	12 38	21 38 41.97	-14 52 41.3	0.5	1.8	0.12
22	15 40	21 44 11.95	14 23 57.5	0.5	1.7	0.12	7	12 34	21 38 32.75	14 53 27.7	0.5	1.8	0.12
23	15 36	21 44 7.40	14 24 22.8	0.5	1.7	0.12	8	12 30	21 38 23.50	14 54 14.3	0.5	1.8	0.12
24	15 32	21 44 2.69	14 24 48.9	0.5	1.7	0.12	9	12 26	21 38 14.22	14 55 0.8	0.5	1.8	0.12
25	15 28	21 43 57.81	14 25 15.7	0.5	1.7	0.12	10	12 22	21 38 4.93	14 55 47.4	0.5	1.8	0.12
26	15 24	21 43 52.78	-14 25 43.3	0.5	1.7	0.12	11	12 18	21 37 55.61	-14 56 34.0	0.5	1.8	0.12
27	15 20	21 43 47.59	14 26 11.7	0.5	1.7	0.12	12	12 13	21 37 46.28	14 57 20.6	0.5	1.8	0.12
28	15 16	21 43 42.25	14 26 40.8	0.5	1.7	0.12	13	12 9	21 37 36.95	14 58 7.1	0.5	1.8	0.12
29	15 12	21 43 36.76	14 27 10.6	0.5	1.7	0.12	14	12 5	21 37 27.60	14 58 53.7	0.5	1.8	0.12
30	15 8	21 43 31.12	14 27 41.1	0.5	1.7	0.12	15	12 1	21 37 18.25	14 59 40.1	0.5	1.8	0.12
July 1	15 4	21 43 25.34	-14 28 12.3	0.5	1.7	0.12	16	11 57	21 37 8.89	-15 0 26.5	0.5	1.8	0.12
2	15 0	21 43 19.41	14 28 44.2	0.5	1.7	0.12	17	11 53	21 36 59.55	15 1 12.8	0.5	1.8	0.12
3	14 56	21 43 13.34	14 29 16.8	0.5	1.7	0.12	18	11 49	21 36 50.21	15 1 59.0	0.5	1.8	0.12
4	14 52	21 43 7.14	14 29 50.1	0.5	1.7	0.12	19	11 45	21 36 40.90	15 2 45.0	0.5	1.8	0.12
5	14 48	21 43 0.79	14 30 24.0	0.5	1.7	0.12	20	11 41	21 36 31.59	15 3 30.9	0.5	1.8	0.12
6	14 44	21 42 54.30	-14 30 58.5	0.5	1.7	0.12	21	11 37	21 36 22.31	-15 4 16.7	0.5	1.8	0.12
7	14 40	21 42 47.69	14 31 33.7	0.5	1.7	0.12	22	11 32	21 36 13.05	15 5 2.1	0.5	1.8	0.12
8	14 36	21 42 40.95	14 32 9.5	0.5	1.7	0.12	23	11 28	21 36 3.83	15 5 47.4	0.5	1.8	0.12
9	14 32	21 42 34.08	14 32 45.9	0.5	1.8	0.12	24	11 24	21 35 54.64	15 6 32.4	0.5	1.8	0.12
10	14 28	21 42 27.08	14 33 22.9	0.5	1.8	0.12	25	11 20	21 35 45.47	15 7 17.2	0.5	1.8	0.12
11	14 24	21 42 19.96	-14 34 0.4	0.5	1.8	0.12	26	11 16	21 35 36.36	-15 8 1.7	0.5	1.8	0.12
12	14 20	21 42 12.72	14 34 38.5	0.5	1.8	0.12	27	11 12	21 35 27.29	15 8 45.9	0.5	1.8	0.12
13	14 16	21 42 5.37	14 35 17.1	0.5	1.8	0.12	28	11 8	21 35 18.27	15 9 29.9	0.5	1.8	0.12
14	14 12	21 41 57.89	14 35 56.3	0.5	1.8	0.12	29	11 4	21 35 9.31	15 10 13.4	0.5	1.8	0.12
15	14 8	21 41 50.31	14 36 35.9	0.5	1.8	0.12	30	11 0	21 35 0.40	15 10 56.6	0.5	1.8	0.12
16	14 4	21 41 42.61	-14 37 16.1	0.5	1.8	0.12	31	10 56	21 34 51.54	-15 11 39.6	0.5	1.8	0.12
17	13 59	21 41 34.82	14 37 56.8	0.5	1.8	0.12	Sept. 1	10 52	21 34 42.75	15 12 22.1	0.5	1.8	0.12
18	13 55	21 41 26.92	14 38 37.9	0.5	1.8	0.12	2	10 48	21 34 34.03	15 13 4.2	0.5	1.8	0.12
19	13 51	21 41 18.92	14 39 19.4	0.5	1.8	0.12	3	10 44	21 34 25.37	15 13 45.8	0.5	1.8	0.12
20	13 47	21 41 10.83	14 40 1.4	0.5	1.8	0.12	4	10 40	21 34 16.79	15 14 27.1	0.5	1.8	0.12
21	13 43	21 41 2.64	-14 40 43.8	0.5	1.8	0.12	5	10 35	21 34 8.29	-15 15 8.0	0.5	1.8	0.12
22	13 39	21 40 54.36	-14 41 26.5	0.5	1.8	0.12	6	10 31	21 33 59.86	-15 15 48.4	0.5	1.8	0.12

Stellar magnitude at opposition, in August, 1917, 6.0.



## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S.T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S.T. of Sem. Pass. Mer.
	h m	h m s	" "	" "	" "	s		h m	h m s	" "	" "	" "	s
Sept. 6	10 31	21 33 59.86	-15 15 48.4	0.5	1.8	0.12	Oct. 22	7 26	21 29 52.65	-15 34 34.5	0.4	1.7	0.12
7	10 27	21 33 51.52	15 16 28.4	0.5	1.8	0.12	23	7 22	21 29 51.25	15 34 39.2	0.4	1.7	0.12
8	10 23	21 33 43.26	15 17 7.9	0.5	1.8	0.12	24	7 18	21 29 50.04	15 34 42.9	0.4	1.7	0.12
9	10 19	21 33 35.09	15 17 46.8	0.5	1.8	0.12	25	7 14	21 29 49.02	15 34 45.6	0.4	1.7	0.12
10	10 15	21 33 27.02	15 18 25.2	0.5	1.8	0.12	26	7 11	21 29 48.19	15 34 47.4	0.4	1.7	0.12
11	10 11	21 33 19.04	-15 19 3.1	0.5	1.8	0.12	27	7 7	21 29 47.56	-15 34 48.3	0.4	1.7	0.12
12	10 7	21 33 11.17	15 19 40.4	0.5	1.8	0.12	28	7 3	21 29 47.13	15 34 48.2	0.4	1.7	0.12
13	10 3	21 33 3.41	15 20 17.1	0.5	1.8	0.12	29	6 59	21 29 46.90	15 34 47.2	0.4	1.7	0.12
14	9 59	21 32 55.75	15 20 53.3	0.5	1.8	0.12	30	6 55	21 29 46.87	15 34 45.2	0.4	1.7	0.12
15	9 55	21 32 48.21	15 21 28.9	0.5	1.8	0.12	31	6 51	21 29 47.03	15 34 42.2	0.4	1.7	0.12
16	9 51	21 32 40.77	-15 22 3.8	0.5	1.8	0.12	Nov. 1	6 47	21 29 47.41	-15 34 38.3	0.4	1.7	0.12
17	9 47	21 32 33.45	15 22 38.1	0.5	1.8	0.12	2	6 43	21 29 47.97	15 34 33.4	0.4	1.7	0.12
18	9 43	21 32 26.26	15 23 11.8	0.5	1.8	0.12	3	6 39	21 29 48.73	15 34 27.6	0.4	1.7	0.12
19	9 39	21 32 19.20	15 23 44.8	0.5	1.7	0.12	4	6 35	21 29 49.70	15 34 20.8	0.4	1.7	0.12
20	9 35	21 32 12.26	15 24 17.2	0.5	1.7	0.12	5	6 31	21 29 50.86	15 34 13.1	0.4	1.7	0.12
21	9 30	21 32 5.46	-15 24 48.8	0.5	1.7	0.12	6	6 27	21 29 52.23	-15 34 4.3	0.4	1.7	0.12
22	9 26	21 31 58.78	15 25 19.8	0.5	1.7	0.12	7	6 24	21 29 53.79	15 33 54.6	0.4	1.7	0.12
23	9 22	21 31 52.25	15 25 50.0	0.5	1.7	0.12	8	6 20	21 29 55.55	15 33 43.9	0.4	1.7	0.12
24	9 18	21 31 45.85	15 26 19.5	0.5	1.7	0.12	9	6 16	21 29 57.52	15 33 32.3	0.4	1.7	0.12
25	9 14	21 31 39.60	15 26 48.3	0.5	1.7	0.12	10	6 12	21 29 59.68	15 33 19.7	0.4	1.7	0.12
26	9 10	21 31 33.49	-15 27 16.4	0.5	1.7	0.12	11	6 8	21 30 2.05	-15 33 6.1	0.4	1.7	0.12
27	9 6	21 31 27.53	15 27 43.7	0.5	1.7	0.12	12	6 4	21 30 4.62	15 32 51.6	0.4	1.7	0.12
28	9 2	21 31 21.71	15 28 10.2	0.5	1.7	0.12	13	6 0	21 30 7.39	15 32 36.1	0.4	1.7	0.12
29	8 58	21 31 16.05	15 28 36.0	0.5	1.7	0.12	14	5 56	21 30 10.35	15 32 19.6	0.4	1.7	0.12
30	8 54	21 31 10.55	15 29 1.0	0.5	1.7	0.12	15	5 52	21 30 13.52	15 32 2.2	0.4	1.7	0.12
Oct. 1	8 50	21 31 5.19	-15 29 25.1	0.5	1.7	0.12	16	5 48	21 30 16.89	-15 31 43.8	0.4	1.7	0.12
2	8 46	21 31 0.00	15 29 48.4	0.5	1.7	0.12	17	5 45	21 30 20.45	15 31 24.5	0.4	1.7	0.12
3	8 42	21 30 54.98	15 30 11.1	0.5	1.7	0.12	18	5 41	21 30 24.21	15 31 4.2	0.4	1.7	0.12
4	8 38	21 30 50.11	15 30 32.9	0.5	1.7	0.12	19	5 37	21 30 28.17	15 30 43.0	0.4	1.7	0.12
5	8 34	21 30 45.41	15 30 53.8	0.5	1.7	0.12	20	5 33	21 30 32.32	15 30 20.8	0.4	1.7	0.12
6	8 30	21 30 40.86	-15 31 13.8	0.5	1.7	0.12	21	5 29	21 30 36.68	-15 29 57.7	0.4	1.7	0.12
7	8 26	21 30 36.50	15 31 33.0	0.5	1.7	0.12	22	5 25	21 30 41.23	15 29 33.7	0.4	1.7	0.12
8	8 22	21 30 32.31	15 31 51.5	0.5	1.7	0.12	23	5 22	21 30 45.96	15 29 8.8	0.4	1.7	0.12
9	8 18	21 30 28.28	15 32 9.0	0.5	1.7	0.12	24	5 18	21 30 50.88	15 28 43.0	0.4	1.7	0.11
10	8 14	21 30 24.43	15 32 25.6	0.5	1.7	0.12	25	5 14	21 30 55.99	15 28 16.2	0.4	1.7	0.11
11	8 10	21 30 20.76	-15 32 41.4	0.5	1.7	0.12	26	5 10	21 31 1.29	-15 27 48.6	0.4	1.7	0.11
12	8 6	21 30 17.28	15 32 56.3	0.5	1.7	0.12	27	5 6	21 31 6.77	15 27 20.1	0.4	1.7	0.11
13	8 2	21 30 13.98	15 33 10.3	0.5	1.7	0.12	28	5 2	21 31 12.44	15 26 50.6	0.4	1.7	0.11
14	7 58	21 30 10.86	15 33 23.3	0.5	1.7	0.12	29	4 58	21 31 18.29	15 26 20.2	0.4	1.7	0.11
15	7 54	21 30 7.92	15 33 35.5	0.5	1.7	0.12	30	4 55	21 31 24.33	15 25 49.0	0.4	1.7	0.11
16	7 50	21 30 5.17	-15 33 46.7	0.5	1.7	0.12	Dec. 1	4 51	21 31 30.55	-15 25 17.0	0.4	1.7	0.11
17	7 46	21 30 2.61	15 33 57.0	0.5	1.7	0.12	2	4 47	21 31 36.94	15 24 44.1	0.4	1.7	0.11
18	7 42	21 30 0.23	15 34 6.4	0.5	1.7	0.12	3	4 43	21 31 43.52	15 24 10.3	0.4	1.7	0.11
19	7 38	21 29 58.05	15 34 14.8	0.5	1.7	0.12	4	4 39	21 31 50.28	15 23 35.6	0.4	1.6	0.11
20	7 34	21 29 56.06	15 34 22.3	0.4	1.7	0.12	5	4 36	21 31 57.21	15 23 0.1	0.4	1.6	0.11
21	7 30	21 29 54.26	-15 34 28.9	0.4	1.7	0.12	6	4 32	21 32 4.32	-15 22 23.7	0.4	1.6	0.11
22	7 26	21 29 52.65	-15 34 34.5	0.4	1.7	0.12	7	4 28	21 32 11.59	-15 21 46.5	0.4	1.6	0.11

Stellar magnitude at opposition, in August, 1917, 6.0

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semi-diam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semi-diam.	S. T. of Sem. Pass. Mer.
	h m s	h m s	° ' "	"	"	s		h m s	h m s	° ' "	"	"	s
Jan. 0	13 44	8 25 33.79	+19 0 9.6	0.3	1.3	0.09	Feb. 15	10 38	8 20 25.84	+19 18 5.2	0.3	1.3	0.09
1	13 40	8 25 27.56	19 0 31.5	0.3	1.3	0.09	16	10 34	8 20 19.64	19 18 26.8	0.3	1.3	0.09
2	13 36	8 25 21.27	19 0 53.7	0.3	1.3	0.09	17	10 30	8 20 13.51	19 18 48.1	0.3	1.3	0.09
3	13 32	8 25 14.94	19 1 16.0	0.3	1.3	0.09	18	10 26	8 20 7.46	19 19 9.2	0.3	1.3	0.09
4	13 28	8 25 8.54	19 1 38.5	0.3	1.3	0.09	19	10 22	8 20 1.46	19 19 30.0	0.3	1.3	0.09
5	13 24	8 25 2.09	+19 2 1.3	0.3	1.3	0.09	20	10 18	8 19 55.54	+19 19 50.6	0.3	1.3	0.09
6	13 20	8 24 55.59	19 2 24.1	0.3	1.3	0.09	21	10 14	8 19 49.70	19 20 10.9	0.3	1.3	0.09
7	13 16	8 24 49.04	19 2 47.1	0.3	1.3	0.09	22	10 10	8 19 43.92	19 20 31.1	0.3	1.3	0.09
8	13 12	8 24 42.44	19 3 10.3	0.3	1.3	0.09	23	10 6	8 19 38.23	19 20 50.8	0.3	1.3	0.09
9	13 8	8 24 35.81	19 3 33.6	0.3	1.3	0.09	24	10 2	8 19 32.63	19 21 10.4	0.3	1.3	0.09
10	13 4	8 24 29.14	+19 3 57.0	0.3	1.3	0.09	25	9 58	8 19 27.10	+19 21 29.6	0.3	1.3	0.09
11	13 0	8 24 22.42	19 4 20.5	0.3	1.3	0.09	26	9 54	8 19 21.66	19 21 48.6	0.3	1.3	0.09
12	12 56	8 24 15.67	19 4 44.2	0.3	1.3	0.09	27	9 50	8 19 16.31	19 22 7.3	0.3	1.3	0.09
13	12 52	8 24 8.90	19 5 7.9	0.3	1.3	0.09	28	9 46	8 19 11.05	19 22 25.6	0.3	1.3	0.09
14	12 48	8 24 2.09	19 5 31.7	0.3	1.3	0.09	Mar. 1	9 42	8 19 5.88	19 22 43.6	0.3	1.3	0.09
15	12 43	8 23 55.26	+19 5 55.7	0.3	1.3	0.09	2	9 38	8 19 0.80	+19 23 1.4	0.3	1.3	0.09
16	12 39	8 23 48.39	19 6 19.7	0.3	1.3	0.09	3	9 34	8 18 55.82	19 23 18.8	0.3	1.3	0.09
17	12 35	8 23 41.51	19 6 43.9	0.3	1.3	0.09	4	9 30	8 18 50.93	19 23 35.9	0.3	1.3	0.09
18	12 31	8 23 34.60	19 7 8.0	0.3	1.3	0.09	5	9 26	8 18 46.15	19 23 52.7	0.3	1.3	0.09
19	12 27	8 23 27.69	19 7 32.1	0.3	1.3	0.09	6	9 22	8 18 41.47	19 24 9.1	0.3	1.3	0.09
20	12 23	8 23 20.77	+19 7 56.3	0.3	1.3	0.09	7	9 18	8 18 36.89	+19 24 25.2	0.3	1.3	0.09
21	12 19	8 23 13.84	19 8 20.6	0.3	1.3	0.09	8	9 14	8 18 32.41	19 24 40.9	0.3	1.3	0.09
22	12 15	8 23 6.90	19 8 44.8	0.3	1.3	0.09	9	9 10	8 18 28.05	19 24 56.4	0.3	1.3	0.09
23	12 11	8 22 59.95	19 9 9.0	0.3	1.3	0.09	10	9 6	8 18 23.79	19 25 11.4	0.3	1.3	0.09
24	12 7	8 22 53.01	19 9 33.3	0.3	1.3	0.09	11	9 2	8 18 19.63	19 25 26.0	0.3	1.3	0.09
25	12 3	8 22 46.07	+19 9 57.5	0.3	1.3	0.09	12	8 58	8 18 15.60	+19 25 40.3	0.3	1.3	0.09
26	11 59	8 22 39.13	19 10 21.7	0.3	1.3	0.09	13	8 54	8 18 11.67	19 25 54.3	0.3	1.3	0.09
27	11 55	8 22 32.19	19 10 45.9	0.3	1.3	0.09	14	8 50	8 18 7.85	19 26 7.9	0.3	1.3	0.09
28	11 51	8 22 25.27	19 11 10.0	0.3	1.3	0.09	15	8 46	8 18 4.15	19 26 21.1	0.3	1.3	0.09
29	11 47	8 22 18.37	19 11 34.1	0.3	1.3	0.09	16	8 42	8 18 0.56	19 26 33.9	0.3	1.3	0.09
30	11 43	8 22 11.49	+19 11 58.0	0.3	1.3	0.09	17	8 38	8 17 57.10	+19 26 46.3	0.3	1.3	0.09
31	11 39	8 22 4.62	19 12 21.9	0.3	1.3	0.09	18	8 34	8 17 53.76	19 26 58.4	0.3	1.3	0.09
Feb. 1	11 35	8 21 57.78	19 12 45.7	0.3	1.3	0.09	19	8 30	8 17 50.53	19 27 10.0	0.3	1.3	0.09
2	11 31	8 21 50.96	19 13 9.4	0.3	1.3	0.09	20	8 26	8 17 47.41	19 27 21.2	0.3	1.3	0.09
3	11 27	8 21 44.18	19 13 32.9	0.3	1.3	0.09	21	8 22	8 17 44.43	19 27 32.0	0.3	1.3	0.09
4	11 23	8 21 37.42	+19 13 56.5	0.3	1.3	0.09	22	8 18	8 17 41.58	+19 27 42.4	0.3	1.3	0.09
5	11 19	8 21 30.69	19 14 19.9	0.3	1.3	0.09	23	8 14	8 17 38.85	19 27 52.4	0.3	1.3	0.09
6	11 15	8 21 24.01	19 14 43.1	0.3	1.3	0.09	24	8 10	8 17 36.24	19 28 2.0	0.3	1.2	0.09
7	11 11	8 21 17.36	19 15 6.2	0.3	1.3	0.09	25	8 6	8 17 33.77	19 28 11.1	0.3	1.2	0.09
8	11 6	8 21 10.75	19 15 29.2	0.3	1.3	0.09	26	8 2	8 17 31.43	19 28 19.8	0.3	1.2	0.09
9	11 2	8 21 4.18	+19 15 52.1	0.3	1.3	0.09	27	7 58	8 17 29.22	+19 28 28.1	0.3	1.2	0.09
10	10 58	8 20 57.65	19 16 14.7	0.3	1.3	0.09	28	7 54	8 17 27.13	19 28 36.1	0.3	1.2	0.09
11	10 54	8 20 51.18	19 16 37.2	0.3	1.3	0.09	29	7 50	8 17 25.18	19 28 43.6	0.3	1.2	0.09
12	10 50	8 20 44.76	19 16 59.5	0.3	1.3	0.09	30	7 46	8 17 23.36	19 28 50.6	0.3	1.2	0.09
13	10 46	8 20 38.40	19 17 21.6	0.3	1.3	0.09	31	7 42	8 17 21.68	19 28 57.2	0.3	1.2	0.09
14	10 42	8 20 32.10	+19 17 43.6	0.3	1.3	0.09	Apr. 1	7 38	8 17 20.12	+19 29 3.4	0.3	1.2	0.09
15	10 38	8 20 25.84	+19 18 5.2	0.3	1.3	0.09	2	7 34	8 17 18.70	+19 29 9.1	0.3	1.2	0.09

Stellar magnitude at opposition in January, 1917, 7.1.

## FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	" " "	"	"	s		h m h					
Apr. 1	7 38	8 17 20.12	+19 29 3.4	0.3	1.2	0.09	Nov. 15	16 58 8					
2	7 34	8 17 18.70	19 29 9.1	0.3	1.2	0.09		16 16 54 8					
3	7 30	8 17 17.41	19 29 14.4	0.3	1.2	0.09		17 16 50 8					
4	7 26	8 17 16.25	19 29 19.3	0.3	1.2	0.09		18 16 46 8					
5	7 22	8 17 15.23	19 29 23.7	0.3	1.2	0.09		19 16 42 8					
6	7 18	8 17 14.35	+19 29 27.6	0.3	1.2	0.09		20 16 38 8					
7	7 14	8 17 13.61	19 29 31.2	0.3	1.2	0.09		21 16 34 8					
8	7 10	8 17 13.00	19 29 34.3	0.3	1.2	0.09		22 16 30 8					
9	7 7	8 17 12.52	19 29 37.0	0.3	1.2	0.09		23 16 27 8					
10	7 3	8 17 12.18	19 29 39.2	0.3	1.2	0.09		24 16 23 8					
11	6 59	8 17 11.98	+19 29 41.1	0.3	1.2	0.09		25 16 19 8					
12	6 55	8 17 11.92	19 29 42.5	0.3	1.2	0.09		26 16 15 8					
13	6 51	8 17 11.99	19 29 43.3	0.3	1.2	0.09		27 16 11 8					
14	6 47	8 17 12.20	19 29 43.7	0.3	1.2	0.09		28 16 7 8					
15	6 43	8 17 12.54	19 29 43.7	0.3	1.2	0.09		29 16 3 8					
16	6 39	8 17 13.03	+19 29 43.2	0.3	1.2	0.09		30 15 59 8					
17	6 35	8 17 13.64	19 29 42.3	0.3	1.2	0.09	Dec. 1	15 55 8					
18	6 31	8 17 14.40	19 29 40.9	0.3	1.2	0.09		2 15 51 8					
19	6 27	8 17 15.30	19 29 39.1	0.3	1.2	0.09		3 15 47 8					
20	6 23	8 17 16.33	19 29 36.8	0.3	1.2	0.09		4 15 43 8					
Oct. 20	18 40	8 37 25.29	+18 21 32.8	0.3	1.2	0.09		5 15 39 8					
21	18 36	8 37 27.91	18 21 23.5	0.3	1.2	0.09		6 15 35 8					
22	18 32	8 37 30.39	18 21 14.5	0.3	1.2	0.09		7 15 31 8					
23	18 28	8 37 32.74	18 21 6.1	0.3	1.2	0.09		8 15 27 8					
24	18 24	8 37 34.95	18 20 58.1	0.3	1.2	0.09		9 15 23 8					
25	18 20	8 37 37.03	+18 20 50.6	0.3	1.2	0.09		10 15 19 8					
26	18 17	8 37 38.98	18 20 43.7	0.3	1.2	0.09		11 15 15 8					
27	18 13	8 37 40.79	18 20 37.3	0.3	1.2	0.09		12 15 11 8	36 37.37	18 24 47.6	0.3	1.3	0.09
28	18 9	8 37 42.46	18 20 31.4	0.3	1.2	0.09		13 15 7 8	36 33.03	18 25 4.1	0.3	1.3	0.09
29	18 5	8 37 43.99	18 20 26.0	0.3	1.2	0.09		14 15 3 8	36 28.59	18 25 20.9	0.3	1.3	0.09
30	18 1	8 37 45.39	+18 20 21.1	0.3	1.2	0.09		15 14 59 8	36 24.04	+18 25 38.2	0.3	1.3	0.09
31	17 57	8 37 46.65	18 20 16.7	0.3	1.2	0.09		16 14 55 8	36 19.38	18 25 55.8	0.3	1.3	0.09
Nov. 1	17 53	8 37 47.77	18 20 12.8	0.3	1.2	0.09		17 14 51 8	36 14.63	18 26 13.8	0.3	1.3	0.09
2	17 49	8 37 48.75	18 20 9.4	0.3	1.2	0.09		18 14 47 8	36 9.77	18 26 32.2	0.3	1.3	0.09
3	17 45	8 37 49.59	18 20 6.6	0.3	1.2	0.09		19 14 43 8	36 4.82	18 26 50.8	0.3	1.3	0.09
4	17 41	8 37 50.30	+18 20 4.2	0.3	1.2	0.09		20 14 39 8	35 59.77	+18 27 9.9	0.3	1.3	0.09
5	17 37	8 37 50.87	18 20 2.4	0.3	1.2	0.09		21 14 35 8	35 54.62	18 27 29.3	0.3	1.3	0.09
6	17 33	8 37 51.30	18 20 1.1	0.3	1.2	0.09		22 14 31 8	35 49.39	18 27 49.1	0.3	1.3	0.09
7	17 30	8 37 51.59	18 20 0.3	0.3	1.2	0.09		23 14 27 8	35 44.06	18 28 9.1	0.3	1.3	0.09
8	17 26	8 37 51.74	18 20 0.0	0.3	1.2	0.09		24 14 23 8	35 38.66	18 28 29.5	0.3	1.3	0.09
9	17 22	8 37 51.75	+18 20 0.3	0.3	1.2	0.09		25 14 19 8	35 33.17	+18 28 50.1	0.3	1.3	0.09
10	17 18	8 37 51.62	18 20 1.0	0.3	1.2	0.09		26 14 15 8	35 27.60	18 29 11.1	0.3	1.3	0.09
11	17 14	8 37 51.36	18 20 2.3	0.3	1.2	0.09		27 14 11 8	35 21.95	18 29 32.3	0.3	1.3	0.09
12	17 10	8 37 50.95	18 20 4.1	0.3	1.2	0.09		28 14 7 8	35 16.22	18 29 53.8	0.3	1.3	0.09
13	17 6	8 37 50.41	18 20 6.5	0.3	1.2	0.09		29 14 2 8	35 10.41	18 30 15.6	0.3	1.3	0.09
14	17 2	8 37 49.73	+18 20 9.3	0.3	1.2	0.09		30 13 58 8	35 4.54	+18 30 37.6	0.3	1.3	0.09
15/16 58/8	16 58/8	37 48.91	+18 20 12.7	0.3	1.2	0.09		31 13 54 8	34 58.58	+18 31 0.0	0.3	1.3	0.09

Stellar magnitude at opposition in January, 1917, 7.1.

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PART III.

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PHENOMENA.

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In the year 1917 there will be seven eclipses, four of the Sun and three of the Moon.

I.—*A Total Eclipse of the Moon*, 1917, January 7, visible at Washington; the beginning visible generally in central and western Europe, northwestern Africa, North and South America, and the central and eastern portions of the Pacific Ocean; the ending visible generally in North America, northwestern South America, northern and northeastern Asia, and eastern Australia.

#### ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, January 7				d	h	m	s	
				7	19	37	51.9	
Sun's right ascension	h	m	s	19	15	47.52	Hourly motion	10.92
Moon's right ascension	7	15	47.52	Hourly motion			126.02	
	.	'	"				'	"
Sun's declination	-22	18	27.7	Hourly motion			+ 0	19.7
Moon's declination	+22	31	53.8	Hourly motion			- 6	34.0
Sun's equa. hor. parallax			8.9	Sun's true semidiameter			16	15.9
Moon's equa. hor. parallax	54		9.8	Moon's true semidiameter			14	44.8

#### CIRCUMSTANCES OF THE ECLIPSE.

	d	h	m	
Moon enters penumbra	Jan.	7	16	35.7
Moon enters shadow		7	17	50.4
Total eclipse begins		7	19	0.4
Middle of the eclipse		7	19	44.6
Total eclipse ends		7	20	28.8
Moon leaves shadow		7	21	38.6
Moon leaves penumbra		7	22	52.7

Greenwich Mean Time.

Contacts of Shadow with Moon's Limb.	Angles of Position from the North Point.	The Moon Being in the Zenith in Longitude from Greenwich	and in Latitude
First	117 to E.	+ 86 48	+22 43
Last	91 to W.	+142 0	+22 18

Magnitude of the eclipse=1.389 (Moon's diameter=1.0).

II.—*A Partial Eclipse of the Sun*, 1917, January 22, invisible at Washington.

#### ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, January 22				d	h	m	s		
				22	20	8	29.8		
Sun and Moon's R. A	<sup>h</sup>	<sup>m</sup>	<sup>s</sup>	20	20	15.52	Hourly motions	<sup>s</sup> 10.51 and 152.97	
	•	'	"					'	"
Sun's declination	-19	32	52.6	Hourly motion				+ 0	34.9
Moon's declination	-18	18	23.6	Hourly motion				+12	3.2
Sun's equa. hor. parallax			8.9	Sun's true semidiameter				16	14.8
Moon's equa. hor. parallax	61	26.7		Moon's true semidiameter				16	43.7

#### CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.	Longitude from Greenwich.	Latitude.
Eclipse begins	Jan. 22 17 43.4	-18 2.1	+28 1.6
Greatest eclipse	22 19 28.3	-25 42.7	+63 15.2
Eclipse ends	22 21 13.0	-95 56.2	+60 28.0

Magnitude of greatest eclipse=0.725 (Sun's diameter=1.0).

### III.—A Partial Eclipse of the Sun, 1917, June 18–19, invisible at Washington.

#### ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, June 19				d h m s			
				1	4	37.1	
Sun and Moon's R. A.		<sup>h</sup> <sup>m</sup> <sup>s</sup>		Hourly motions			
		5 49 44.49		10.40 and 137.78			
Sun's declination	+23 25 46.2			Hourly motion			
Moon's declination	+24 37 15.9			+ 0 2.5			
Sun's equa. hor. parallax	8.7			Hourly motion			
Moon's equa. hor. parallax	55 34.9			– 2 15.1			
				Sun's true semidiameter			
				15 44.3			
				Moon's true semidiameter			
				15 8.0			

#### CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.	Longitude from Greenwich.	Latitude.
	d h m	d h m	d h m
Eclipse begins	June 18 23 36.0	+118 43.2	+52 54.9
Greatest eclipse	19 1 16.2	–150 6.0	+66 10.5
Eclipse ends	19 2 56.5	– 72 35.0	+45 48.3

Magnitude of greatest eclipse=0.473 (Sun's diameter=1.0).

IV.—A Total Eclipse of the Moon, 1917, July 4, invisible at Washington; the beginning visible generally in Asia except the northeastern portion, Australia, Africa, Europe except the northwestern portions, and the south Atlantic Ocean; the ending visible generally in western Australia, southwestern Asia, Europe, Africa, and South America.

#### ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, July 4				d h m s			
				4	9	41 46.3	
Sun's right ascension		<sup>h</sup> <sup>m</sup> <sup>s</sup>		Hourly motion			
		6 53 27.05		10.30			
Moon's right ascension		18 53 27.05		Hourly motion			
				157.11			
Sun's declination	+22 52 53.9			Hourly motion			
Moon's declination	–22 44 11.1			– 0 13.1			
Sun's equa. hor. parallax	8.7			Hourly motion			
Moon's equa. hor. parallax	60 17.1			+ 6 45.3			
				Sun's true semidiameter			
				15 43.9			
				Moon's true semidiameter			
				16 24.8			

#### CIRCUMSTANCES OF THE ECLIPSE.

	July	d h m	} Greenwich Mean Time.
Moon enters penumbra	4	6 55.8	
Moon enters shadow	4	7 52.2	
Total eclipse begins	4	8 50.6	
Middle of the eclipse	4	9 38.9	
Total eclipse ends	4	10 27.2	
Moon leaves shadow	4	11 25.4	
Moon leaves penumbra	4	12 21.3	

Contacts of Shadow with Moon's Limb.	Angles of Position from the North Point.	The Moon being in the Zenith	
		in Longitude from Greenwich	and in Latitude
		d h m	d h m
First	87 to E.	–61 52	–22 56
Last	109 to W.	–10 45	–22 32

Magnitude of the eclipse=1.625 (Moon's diameter=1.0).

V.—*A Partial Eclipse of the Sun, 1917, July 18, invisible at Washington.*

## ELEMENTS OF THE ECLIPSE.

Greenwich mean time of  $\delta$  in right ascension, July 18 <sup>d</sup> 15 <sup>h</sup> 34 <sup>m</sup> 16.<sup>s</sup>8

Sun and Moon's R. A.	<sup>h</sup> 7 <sup>m</sup> 51 <sup>s</sup> 28.79	Hourly motions	<sup>s</sup> 10.05 and 123.17
Sun's declination	+20 58 48.8	Hourly motion	— 0 26.6
Moon's declination	+19 33 20.4	Hourly motion	— 8 12.7
Sun's equa. hor. parallax	8.7	Sun's true semidiameter	15 44.3
Moon's equa. hor. parallax	54 28.4	Moon's true semidiameter	14 49.9

## CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.	Longitude from Greenwich.	Latitude.
	<sup>d</sup> <sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>
Eclipse begins	July 18 13 56.5	— 93 30.7	—53 24.3
Greatest eclipse	18 14 42.5	—101 52.2	—63 43.5
Eclipse ends	18 15 28.3	—124 27.5	—68 56.6

Magnitude of greatest eclipse=0.086 (Sun's diameter=1.0).

VI.—*An Annular Eclipse of the Sun, 1917, December 13, invisible at Washington.*

## ELEMENTS OF THE ECLIPSE.

Greenwich mean time of  $\delta$  in right ascension, December 13 <sup>d</sup> 21 <sup>h</sup> 23 <sup>m</sup> 24.<sup>s</sup>0

Sun and Moon's R. A.	<sup>h</sup> 17 <sup>m</sup> 24 <sup>s</sup> 27.34	Hourly motions	<sup>s</sup> 11.05 and 149.88
Sun's declination	—23 11 54.5	Hourly motion	— 0 9.4
Moon's declination	—24 4 57.9	Hourly motion	+ 1 0.1
Sun's equa. hor. parallax	8.9	Sun's true semidiameter	16 15.0
Moon's equa. hor. parallax	58 2.5	Moon's true semidiameter	15 48.2

## CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time.	Longitude from Greenwich.	Latitude.
	<sup>d</sup> <sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>
Eclipse begins	Dec. 13 19 9.7	+ 36 6.9	—34 48.4
Central eclipse begins	13 20 43.8	+ 87 52.7	—59 1.9
Central eclipse at local apparent midnight	13 21 23.4	+142 12.8	—89 56.6
Central eclipse ends	13 22 10.5	—155 41.2	—56 7.8
Eclipse ends	13 23 44.5	—107 27.1	—31 1.9

VII.—*A Total Eclipse of the Moon*, 1917, December 27, visible at Washington; the beginning visible generally in North and South America, throughout the Pacific Ocean, and the extreme northeastern portion of Asia; the ending visible generally in North America, throughout the Pacific Ocean, in eastern Asia, and Australia.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of $\delta$ in right ascension, December				d	h	m	s
				27	21	53	49.2
Sun's right ascension	h	m	s	Hourly motion			
	18	26	39.29				
Moon's right ascension	6	26	39.29	Hourly motion			
	.	'	"				
Sun's declination	-23	18	30.5	Hourly motion			
	+22	52	58.5	Hourly motion			
Moon's declination							
Sun's equa. hor. parallax	8.9			Sun's true semidiameter			
Moon's equa. hor. parallax	56	20.1		Moon's true semidiameter			

CIRCUMSTANCES OF THE ECLIPSE.

	d	h	m	} Greenwich Mean Time.
Moon enters penumbra	Dec. 27	18	53.5	
Moon enters shadow	27	20	5.1	
Total eclipse begins	27	21	38.1	
Middle of the eclipse	27	21	46.3	
Total eclipse ends	27	21	54.6	
Moon leaves shadow	27	23	27.4	
Moon leaves penumbra	27	24	38.8	

Contacts of Shadow with Moon's Limb.	Angles of Position from the North Point.	The Moon being in the Zenith	
		in Longitude from Greenwich	and in Latitude
First	72 to E.	+121 52	+23 1
Last	55 to W.	+170 39	+22 46

Magnitude of the eclipse=1.011 (Moon's diameter=1.0).

The regions within which the first, second, and fourth eclipses of the Sun are visible are laid down on the accompanying charts, from which, by means of the dotted lines, the Greenwich mean times of beginning and ending at any place may be found with an uncertainty which will vary from three or four minutes for a high Sun to fifteen or twenty minutes when the Sun is near the horizon.



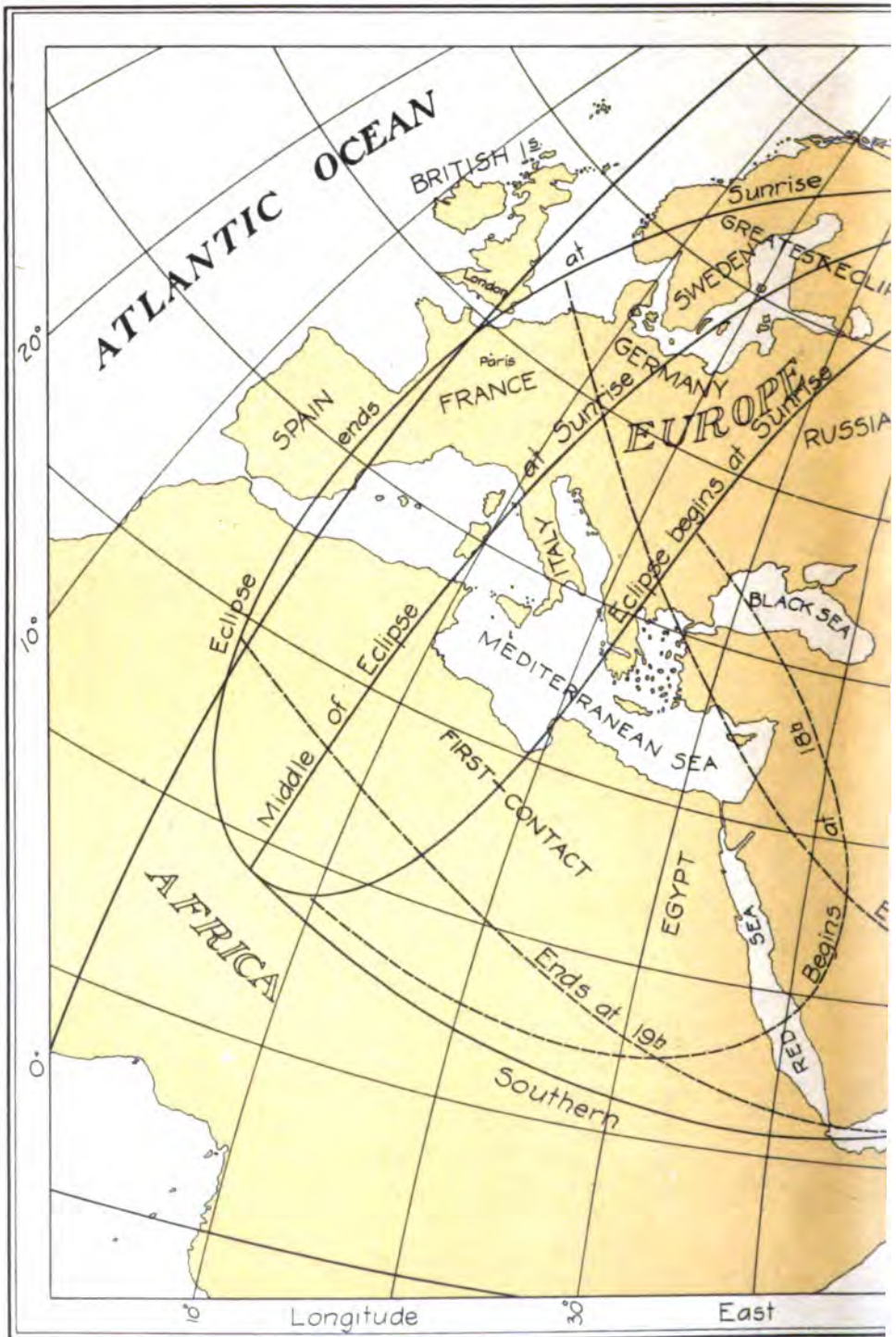
BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,  
1917, JANUARY 22.

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	<i>z</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	<i>μ</i>	<i>l</i>
<i>h m</i>					<i>s .</i>	
17 40	-1.36546	+0.75266	-9.52507	+9.97415	262 1.8	+0.53795
50	1.27351	0.78377	9.52504	9.97415	264 31.8	0.53796
18 0	-1.18156	+0.81488	-9.52501	+9.97416	267 1.8	+0.53796
10	1.08961	0.84600	9.52497	9.97416	269 31.7	0.53796
20	0.99765	0.87713	9.52494	9.97416	272 1.7	0.53797
30	0.90570	0.90826	9.52491	9.97417	274 31.7	0.53797
40	0.81374	0.93939	9.52487	9.97417	277 1.7	0.53797
50	0.72179	0.97053	9.52484	9.97418	279 31.7	0.53797
19 0	-0.62983	+1.00167	-9.52481	+9.97418	282 1.7	+0.53797
10	0.53788	1.03282	9.52478	9.97419	284 31.7	0.53797
20	0.44593	1.06397	9.52474	9.97419	287 1.7	0.53797
30	0.35397	1.09513	9.52471	9.97419	289 31.6	0.53797
40	0.26202	1.12629	9.52468	9.97420	292 1.6	0.53796
50	0.17007	1.15746	9.52465	9.97420	294 31.6	0.53796
20 0	-0.07812	+1.18863	-9.52461	+9.97421	297 1.6	+0.53796
10	+0.01382	1.21980	9.52458	9.97421	299 31.6	0.53795
20	0.10577	1.25098	9.52455	9.97421	302 1.6	0.53795
30	0.19771	1.28216	9.52451	9.97422	304 31.6	0.53794
40	0.28964	1.31335	9.52448	9.97422	307 1.6	0.53793
50	0.38158	1.34454	9.52445	9.97423	309 31.5	0.53792
21 0	+0.47351	+1.37573	-9.52442	+9.97423	312 1.5	+0.53791
10	0.56544	1.40693	9.52438	9.97423	314 31.5	0.53791
20	+0.65737	+1.43813	-9.52435	+9.97424	317 1.5	+0.53790

Greenwich Mean Time.	Log <i>z'</i> for 1 Minute.	Log <i>y'</i> for 1 Minute.	Log <i>μ'</i> for 1 Minute.	Log Tangent of Angle of Cone.
				Penumbra.
<i>h m</i>				
17 0	+7.9635	+7.4925	+1.1761	+7.67665
18 0	7.9636	7.4930	1.1761	7.67665
19 0	7.9636	7.4934	1.1761	7.67665
20 0	7.9635	7.4938	1.1761	7.67665
21 0	7.9635	7.4941	1.1761	7.67664
22 0	+7.9633	+7.4943	+1.1761	+7.67664



# PARTIAL ECLIPSE OF



Note:- The hours of beginning and end

JANUARY 22<sup>nd</sup> 1917

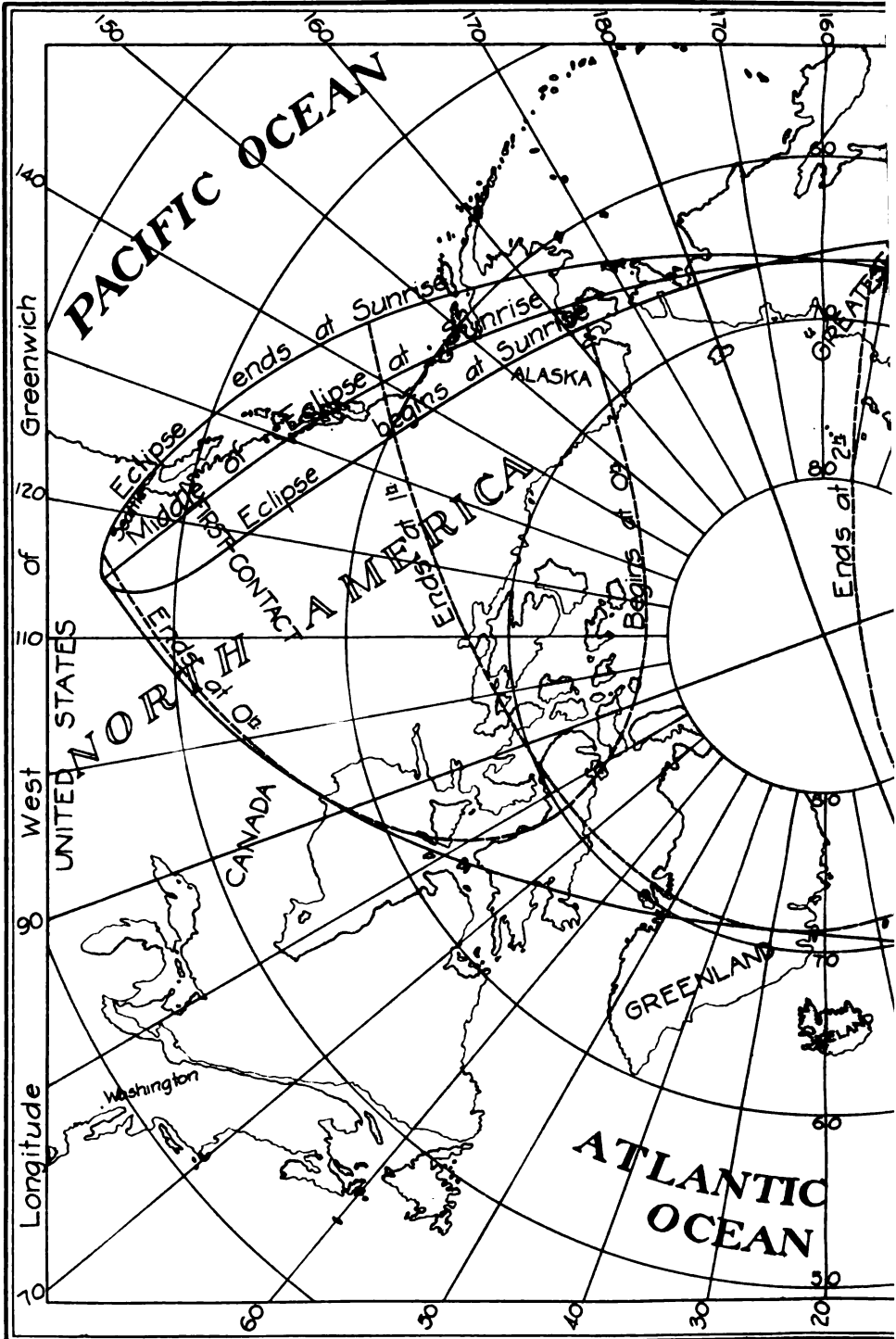


...ing are expressed in Greenwich Mean Time





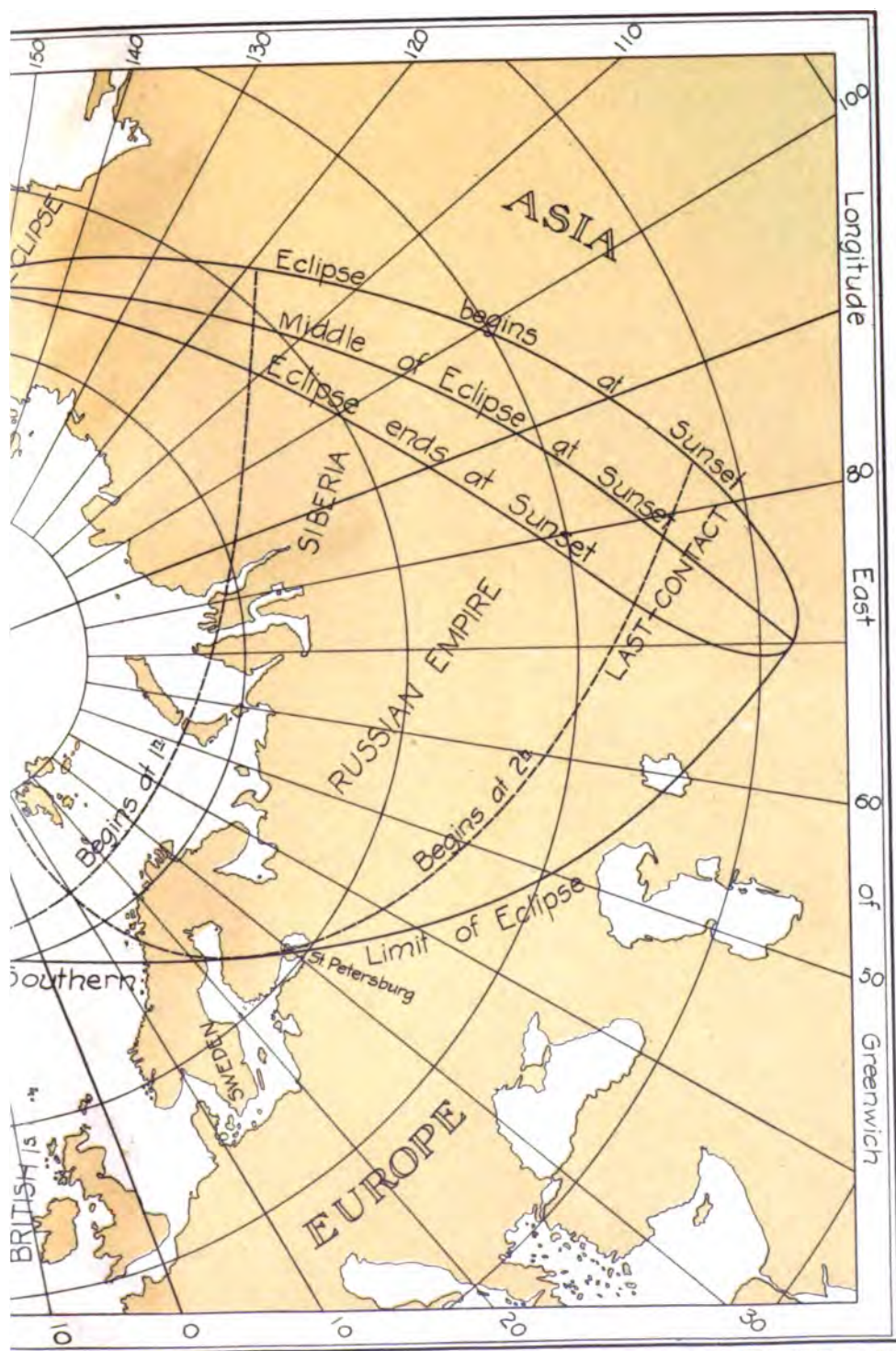
# PARTIAL ECLIPSE



*Note: The hours of beginning and ending*



# OF JUNE 18<sup>th</sup> 1917.



ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

are expressed in Greenwich Mean Time.





**BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,  
1917, JUNE 18-19.**

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	$x$	$y$	Log sin $d$	Log cos $d$	$\mu$	
h m					s "	
23 30	-0.82353	+1.35363	+9.59939	+9.96264	352 15.0	+0.55664
40	0.73650	1.34691	9.59939	9.96264	354 45.0	0.55666
50	0.64946	1.34019	9.59940	9.96264	357 15.0	0.55668
0 0	-0.56242	+1.33345	+9.59940	+9.96264	359 45.0	+0.55670
10	0.47538	1.32670	9.59940	9.96264	2 15.0	0.55672
20	0.38834	1.31993	9.59940	9.96264	4 45.0	0.55674
30	0.30131	1.31316	9.59941	9.96264	7 14.9	0.55676
40	0.21427	1.30637	9.59941	9.96264	9 44.9	0.55678
50	0.12723	1.29958	9.59941	9.96264	12 14.9	0.55680
1 0	-0.04020	+1.29277	+9.59941	+9.96264	14 44.9	+0.55682
10	+0.04683	1.28594	9.59942	9.96264	17 14.9	0.55683
20	0.13387	1.27911	9.59942	9.96264	19 44.9	0.55685
30	0.22089	1.27227	9.59942	9.96264	22 14.9	0.55687
40	0.30792	1.26541	9.59942	9.96264	24 44.9	0.55688
50	0.39495	1.25854	9.59942	9.96264	27 14.9	0.55690
2 0	+0.48197	+1.25166	+9.59943	+9.96264	29 44.9	+0.55691
10	0.56899	1.24477	9.59943	9.96264	32 14.9	0.55692
20	0.65601	1.23787	9.59943	9.96264	34 44.8	0.55694
30	0.74302	1.23095	9.59943	9.96264	37 14.8	0.55695
40	0.83004	1.22403	9.59944	9.96264	39 44.8	0.55696
50	0.91704	1.21709	9.59944	9.96264	42 14.8	0.55697
3 0	+1.00405	+1.21014	+9.59944	+9.96263	44 44.8	+0.55699

Greenwich Mean Time.	Log $x'$ for 1 Minute.	Log $y'$ for 1 Minute.	Log $\mu'$ for 1 Minute.	Log Tangent of Angle of Cone.
				Penumbra.
h m				
23 0	+7.9397	-6.8243	+1.1761	+7.66289
0 0	7.9397	6.8290	1.1761	7.66289
1 0	7.9397	6.8335	1.1761	7.66289
2 0	7.9396	6.8380	1.1761	7.66289
3 0	+7.9395	-6.8423	+1.1761	+7.66289

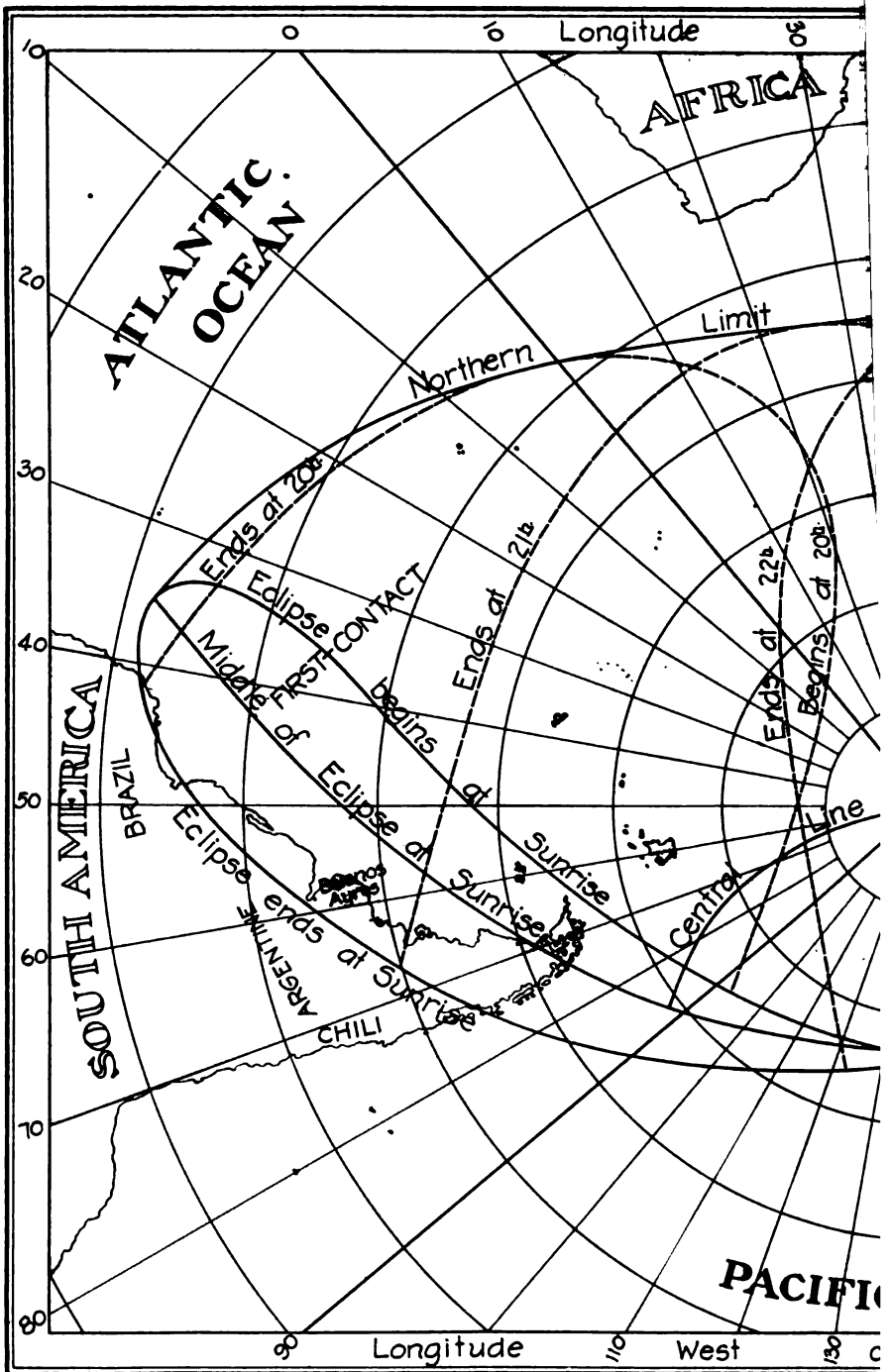
BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN,  
1917, JULY 18.

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra on Fundamental Plane.
	<i>x</i>	<i>y</i>	Log sin <i>d</i>	Log cos <i>d</i>	<i>μ</i>	<i>l</i>
h m						
13 50	−0.85286	−1.32437	+9.55426	+9.97016	205 59.5	+0.56250
14 0	−0.77088	−1.34822	+9.55423	+9.97017	208 29.5	+0.56251
10	0.68911	1.37206	9.55421	9.97017	210 59.6	0.56253
20	0.60734	1.39591	9.55419	9.97017	213 29.6	0.56254
30	0.52556	1.41977	9.55416	9.97018	215 59.6	0.56255
40	0.44379	1.44362	9.55414	9.97018	218 29.6	0.56256
50	0.36202	1.46748	9.55412	9.97018	220 59.6	0.56257
15 0	−0.28025	−1.49135	+9.55409	+9.97019	223 29.6	+0.56258
10	0.19849	1.51522	9.55407	9.97019	225 59.6	0.56259
20	0.11672	1.53909	9.55405	9.97019	228 29.6	0.56260
30	−0.03496	−1.56297	+9.55402	+9.97020	230 59.6	+0.56261

Greenwich Mean Time.	Log <i>x'</i> for 1 Minute.	Log <i>y'</i> for 1 Minute.	Log <i>μ'</i> for 1 Minute.	Log Tangent of Angle of Cone.
				Penumbra.
h m				
13 0	+7.9126	−7.3769	+1.1761	+7.66292
14 0	7.9126	7.3774	1.1761	7.66292
15 0	7.9126	7.3778	1.1761	7.66292
16 0	+7.9125	−7.3782	+1.1761	+7.66292

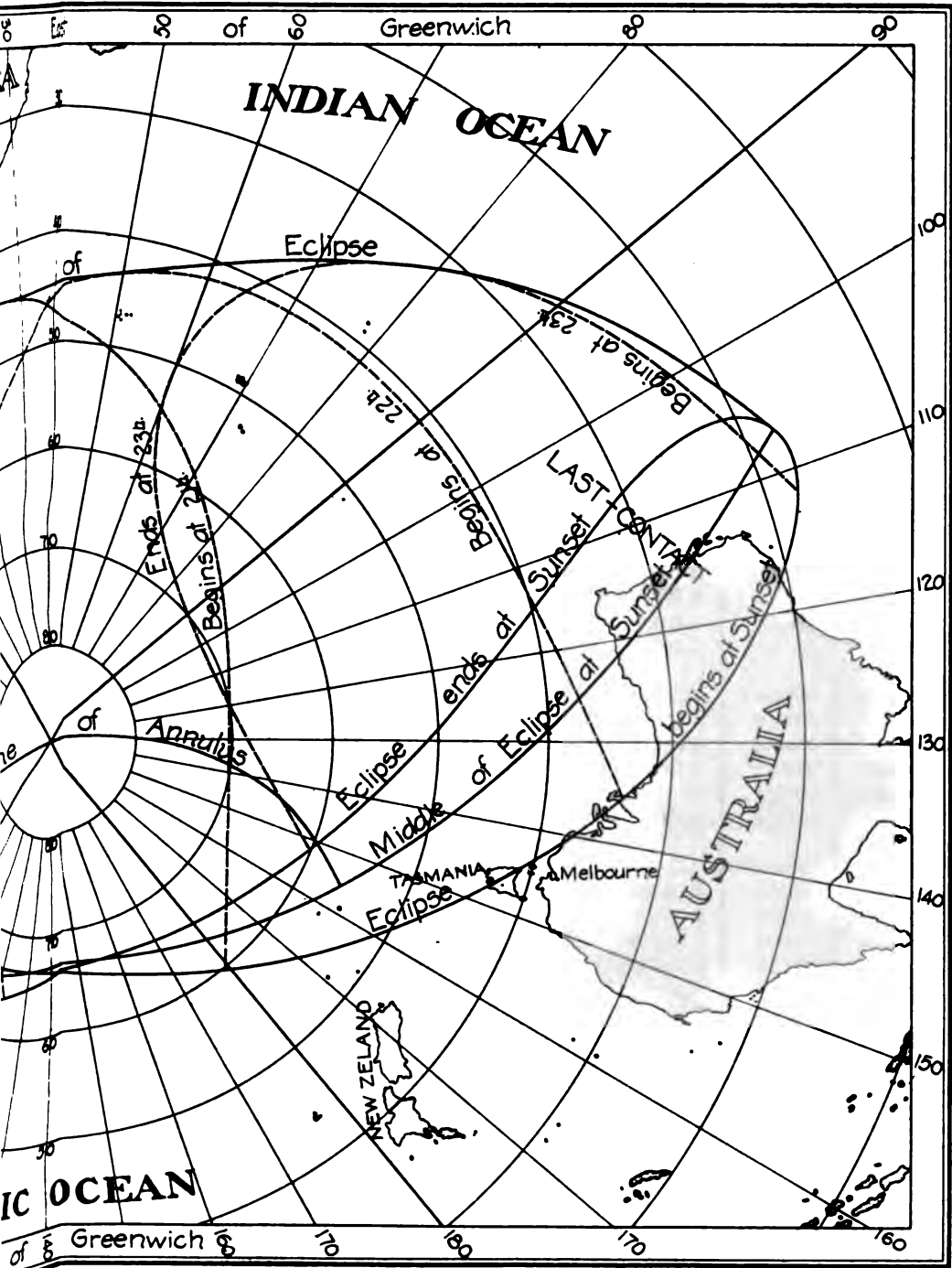


# ANNULAR ECLIPSE



Note:- The hours of beginning and

ECLIPSE OF DECEMBER 13<sup>th</sup> 1917



and ending are expressed in Greenwich Mean Time.



**BESSELIAN ELEMENTS OF THE ANNULAR ECLIPSE OF THE SUN,  
1917, DECEMBER 13.**

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra and Shadow on Fundamental Plane.	
	$x$	$y$	$\text{Log sin } d$	$\text{Log cos } d$	$\mu$	$l_1$	$l_2$
h m							
19 0	-1.30792	-0.96399	-9.59525	+9.96341	286 22.3	+0.55386	+0.00791
10	1.21673	0.96076	9.59526	9.96341	288 52.3	0.55385	0.00790
20	1.12554	0.95751	9.59527	9.96341	291 22.3	0.55384	0.00788
30	1.03434	0.95425	9.59528	9.96341	293 52.2	0.55383	0.00787
40	0.94314	0.95098	9.59528	9.96341	296 22.2	0.55382	0.00786
50	0.85194	0.94770	9.59529	9.96341	298 52.2	0.55380	0.00785
20 0	-0.76073	-0.94440	-9.59530	+9.96340	301 22.1	+0.55379	+0.00783
10	0.66952	0.94110	9.59531	9.96340	303 52.1	0.55377	0.00782
20	0.57831	0.93778	9.59532	9.96340	306 22.0	0.55376	0.00780
30	0.48710	0.93445	9.59532	9.96340	308 52.0	0.55374	0.00779
40	0.39588	0.93111	9.59533	9.96340	311 22.0	0.55373	0.00777
50	0.30467	0.92775	9.59534	9.96340	313 51.9	0.55371	0.00775
21 0	-0.21345	-0.92438	-9.59535	+9.96340	316 21.9	+0.55369	+0.00774
10	0.12223	0.92101	9.59535	9.96339	318 51.9	0.55367	0.00772
20	-0.03101	0.91762	9.59536	9.96339	321 21.8	0.55365	0.00770
30	+0.06021	0.91421	9.59537	9.96339	323 51.8	0.55363	0.00768
40	0.15143	0.91080	9.59538	9.96339	326 21.8	0.55361	0.00766
50	0.24265	0.90737	9.59539	9.96339	328 51.7	0.55359	0.00764
22 0	+0.33388	-0.90394	-9.59539	+9.96339	331 21.7	+0.55357	+0.00762
10	0.42510	0.90049	9.59540	9.96339	333 51.7	0.55355	0.00759
20	0.51632	0.89703	9.59541	9.96338	336 21.6	0.55353	0.00757
30	0.60754	0.89355	9.59542	9.96338	338 51.6	0.55350	0.00755
40	0.69876	0.89007	9.59542	9.96338	341 21.6	0.55348	0.00752
50	0.78998	0.88657	9.59543	9.96338	343 51.5	0.55345	0.00750
23 0	+0.88120	-0.88307	-9.59544	+9.96338	346 21.5	+0.55343	+0.00747
10	0.97242	0.87955	9.59545	9.96338	348 51.5	0.55340	0.00745
20	1.06363	0.87602	9.59546	9.96338	351 21.4	0.55337	0.00742
30	1.15485	0.87247	9.59546	9.96337	353 51.4	0.55335	0.00739
40	1.24606	0.86892	9.59547	9.96337	356 21.3	0.55332	0.00736
50	+1.33727	-0.86535	-9.59548	+9.96337	358 51.3	+0.55329	+0.00734

Greenwich Mean Time.	Log $x'$ for 1 Minute.	Log $y'$ for 1 Minute.	Log $\mu'$ for 1 Minute.	Log Tangents of Angles of Cones.	
				Penumbra.	Shadow.
h m					
19 0	+7.9599	+6.5090	+1.1760	+7.67678	+7.67461
20 0	7.9600	6.5186	1.1760	7.67678	7.67461
21 0	7.9601	6.5279	1.1760	7.67678	7.67461
22 0	7.9601	6.5370	1.1760	7.67678	7.67461
23 0	7.9601	6.5457	1.1760	7.67678	7.67461
24 0	+7.9600	+6.5544	+1.1760	+7.67678	+7.67461



## 564 STARS OCCULTED BY THE MOON, 1917.

MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.			Annual Proper Motion.
			h	m	s	s	°	'	"	"
36	Piscium	6.2	0	12	18.061	-0.0027	+ 7	46	46.28	-0.006
d	Piscium	5.4	0	16	19.561	+0.0003	7	43	45.86	+0.016
136 B.	Piscium	6.5	0	36	54.451	-0.0084	8	54	8.23	-0.082
58	Piscium	5.7	0	42	41.549	+0.0033	11	31	17.34	-0.025
75	Piscium	6.3	1	2	11.506	+0.0012	12	30	41.64	+0.042
7	Piscium	3.7	1	27	2.336	+0.0015	+14	55	6.06	-0.003
101	Piscium	6.2	1	31	20.025	+0.0010	14	14	15.15	-0.001
105	Piscium	6.1	1	35	11.944	+0.0053	15	59	6.69	-0.006
3	Arietis	6.4	1	42	4.759	+0.0031	16	59	51.57	+0.015
4	Arietis	5.8	1	43	40.616	+0.0035	16	32	34.23	-0.021
2	Arietis	5.1	1	52	48.778	+0.0021	+17	24	45.99	-0.020
35 B.	Arietis	6.4	1	59	9.265	-0.0008	17	51	17.54	-0.018
47 B.	Arietis	6.5	2	3	12.281	-0.0037	17	38	4.20	-0.007
20 H <sup>1</sup>	Arietis	6.4	2	4	49.346	+0.0112	16	50	8.00	-0.179
15	Arietis	5.9	2	6	1.337	+0.0059	19	6	33.12	-0.032
0	Arietis	5.6	2	13	30.336	-0.0007	+19	31	4.04	-0.003
26	Arietis	6.2	2	25	58.908	+0.0050	19	29	15.37	-0.022
μ	Arietis	5.7	2	37	40.977	+0.0023	19	39	30.88	-0.038
47	Arietis	5.8	2	53	19.960	+0.0160	20	20	12.17	-0.021
ε	Arietis (mean)	4.6	2	54	27.735	-0.0009	21	0	32.67	-0.010
ζ	Arietis	5.0	3	10	7.630	-0.0019	+20	44	15.26	-0.082
τ	Arietis	5.2	3	16	25.929	+0.0023	20	50	54.99	-0.033
63	Arietis	5.2	3	17	58.432	-0.0032	20	26	45.94	-0.009
65	Arietis	6.0	3	19	38.782	+0.0006	20	30	35.22	-0.008
66	Arietis	6.1	3	23	35.276	+0.0006	22	31	7.40	-0.112
7	Tauri	5.9	3	29	31.506	+0.0013	+24	11	12.88	-0.023
16	Tauri	5.4	3	39	51.960	+0.0009	24	1	45.17	-0.049
17	Tauri	3.8	3	39	56.601	+0.0016	23	51	11.68	-0.050
18	Tauri	5.6	3	40	12.351	+0.0004	24	34	47.38	-0.038
q	Tauri	4.3	3	40	15.798	+0.0010	24	12	28.48	-0.034
20	Tauri	4.1	3	40	53.075	+0.0016	+24	6	33.49	-0.044
21	Tauri	5.8	3	40	57.563	+0.0012	24	17	46.73	-0.046
22	Tauri	6.5	3	41	6.003	+0.0006	24	16	11.48	-0.039
23	Tauri	4.3	3	41	23.796	+0.0017	23	41	26.18	-0.050
7	Tauri	3.0	3	42	32.843	+0.0016	23	50	57.71	-0.050
104 B.	Tauri	5.5	3	43	25.782	+0.0008	+23	10	1.59	-0.045
27	Tauri	3.7	3	44	13.414	+0.0013	23	48	1.89	-0.048
23	Tauri	5.2	3	44	14.703	+0.0009	23	53	2.52	-0.046
133 B.	Tauri	5.9	3	45	2.197	+0.0025	21	59	33.03	-0.042
32	Tauri	5.8	3	51	57.597	+0.0045	22	14	23.34	-0.112
33	Tauri	6.0	3	52	8.478	+0.0026	+22	56	7.97	-0.009
161 B.	Tauri	6.5	3	56	1.098	+0.0027	22	58	4.20	-0.052
36	Tauri	5.6	3	59	23.644	+0.0001	23	52	41.81	-0.022
192 B.	Tauri	6.1	4	7	55.709	-0.0016	22	12	3.44	-0.019
χ	Tauri	5.3	4	17	31.756	+0.0028	25	26	3.70	-0.029
C2	Tauri	6.1	4	18	59.363	+0.0008	+24	6	30.79	-0.019
v	Tauri	4.2	4	21	20.313	+0.0079	22	37	34.72	-0.047
72	Tauri	5.4	4	22	19.497	+0.0004	22	48	37.13	-0.008
284 B.	Tauri	6.0	4	31	29.183	+0.0109	23	10	19.34	-0.102
τ	Tauri	4.3	4	37	15.692	+0.0007	22	47	55.34	-0.019
95	Tauri	6.2	4	38	12.128	+0.0014	+23	55	57.12	-0.030

MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

Name of Star.	Magni- tude.	Right Ascension.	Annual Proper Motion.	Declination.	Annual Proper Motion.
		h m s	s	° ' "	"
300 B. Tauri . . . .	6.2	4 40 41.687	+0.0006	+23 28 36.43	+0.004
315 B. Tauri . . . .	6.3	4 51 12.205	-0.0001	24 27 37.89	-0.033
99 Tauri . . . . .	6.0	4 52 46.381	+0.0003	23 49 11.34	-0.035
<i>k</i> Tauri . . . . .	5.6	4 53 4.532	+0.0023	24 55 23.31	-0.061
103 Tauri . . . . .	5.5	5 3 3.077	+0.0003	24 9 22.94	-0.021
118 Tauri . . . . .	5.4	5 24 9.974	+0.0015	+25 5 3.37	-0.038
121 Tauri . . . . .	5.1	5 30 22.901	+0.0010	23 59 7.42	-0.031
125 Tauri . . . . .	5.1	5 34 35.552	+0.0018	25 51 5.78	-0.029
394 B. Tauri . . . .	6.0	5 38 17.090	+0.0011	23 9 56.91	-0.042
132 Tauri . . . . .	5.0	5 43 55.306	0.0000	24 32 26.80	-0.023
412 B. Tauri . . . .	5.8	5 51 51.154	....	+24 14 18.91	....
139 Tauri . . . . .	4.7	5 52 50.641	0.0000	25 56 40.93	-0.007
1 Geminorum . . . .	4.3	5 59 4.505	+0.0002	23 16 7.83	-0.109
3 Geminorum . . . .	5.6	6 4 41.651	+0.0014	23 7 41.32	+0.001
5 Geminorum . . . .	5.9	6 6 26.941	+0.0011	24 26 22.44	-0.061
6 Geminorum . . . .	6.3	6 7 17.244	+0.0007	+22 55 41.85	-0.013
<i>η</i> Geminorum ( <i>var.</i> ) .	3.2	6 9 52.098	-0.0038	22 31 54.92	-0.016
8 Geminorum . . . .	6.1	6 11 14.787	-0.0009	23 59 52.01	-0.026
9 Geminorum . . . .	6.2	6 11 54.920	+0.0004	23 46 12.13	-0.006
<i>μ</i> Geminorum . . . .	3.2	6 17 56.386	+0.0046	22 33 26.30	-0.114
36 B. Geminorum . .	6.0	6 20 30.284	-0.0004	+23 22 27.44	+0.015
52 B. Geminorum . .	6.5	6 32 21.972	-0.0021	24 39 38.50	-0.002
<i>ε</i> Geminorum . . . .	3.2	6 38 49.590	-0.0001	25 12 51.95	-0.018
<i>d</i> Geminorum . . . .	5.2	6 46 34.693	+0.0003	21 51 36.19	-0.045
87 B. Geminorum . .	5.8	6 46 57.780	-0.0006	23 42 2.93	-0.021
<i>ω</i> Geminorum . . . .	5.2	6 57 21.435	-0.0003	+24 20 5.47	0.000
<i>ζ</i> Geminorum ( <i>var.</i> ) .	3.7	6 59 11.248	-0.0002	20 41 35.05	-0.007
44 Geminorum . . . .	5.9	7 0 18.650	0.0000	22 45 45.91	-0.020
120 B. Geminorum . .	6.5	7 5 11.403	-0.0062	21 23 33.90	-0.448
<i>δ</i> Geminorum . . . .	3.5	7 15 10.085	-0.0010	22 8 10.35	-0.015
56 Geminorum . . . .	5.2	7 17 3.070	-0.0044	+20 36 4.88	-0.025
58 Geminorum . . . .	6.0	7 18 28.960	-0.0022	23 6 21.33	-0.064
149 B. Geminorum . .	6.4	7 21 56.062	-0.0219	21 42 9.15	-0.022
61 Geminorum . . . .	5.8	7 22 2.878	-0.0002	20 25 27.48	-0.023
63 Geminorum . . . .	5.3	7 22 48.886	-0.0035	21 36 58.09	-0.110
79 Geminorum . . . .	6.3	7 40 17.070	-0.0013	+20 30 58.44	-0.012
<i>γ</i> Geminorum . . . .	5.0	7 41 19.247	-0.0048	18 42 48.58	-0.063
209 B. Geminorum . .	6.2	7 47 37.258	-0.0029	19 32 18.85	-0.080
85 Geminorum . . . .	5.2	7 50 49.393	-0.0011	20 6 14.43	-0.043
217 B. Geminorum . .	6.3	7 55 57.875	-0.0018	20 2 40.83	-0.007
3 Cancrī . . . . .	5.7	7 56 2.077	-0.0001	+17 32 13.11	-0.010
10 H. Cancrī . . . .	6.1	7 59 57.582	-0.0020	19 4 38.61	-0.046
<i>ζ</i> Cancrī ( <i>mean</i> ) . .	4.7	8 7 27.241	+0.0051	17 53 56.75	-0.129
<i>d</i> <sup>1</sup> Cancrī . . . . .	5.9	8 18 36.816	-0.0038	18 35 58.31	-0.031
<i>d</i> <sup>2</sup> Cancrī . . . . .	6.2	8 21 8.140	-0.0132	17 19 14.35	-0.153
<i>θ</i> Cancrī . . . . .	5.5	8 26 51.941	-0.0039	+18 22 32.20	-0.068
90 B. Cancrī . . . .	6.3	8 31 28.571	+0.0006	15 36 5.07	-0.027
54 Cancrī . . . . .	6.3	8 46 24.249	-0.0075	15 39 33.47	+0.076
<i>o</i> <sup>1</sup> Cancrī . . . . .	5.1	8 52 87.325	+0.0041	15 38 30.60	+0.022
<i>o</i> <sup>2</sup> Cancrī . . . . .	5.7	8 52 57.216	+0.0043	15 54 2.86	+0.023
209 B. Cancrī . . . .	6.5	9 5 15.952	-0.0008	+11 54 11.11	-0.079

MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.			Annual Proper Motion.
			h	m	s	s	"	"	"	"
81	Cancer	6.4	9	7	45.207	-0.0359	+15	19	52.49	+0.244
222 B.	Cancer	6.3	9	13	21.711	+0.0046	11	50	57.72	-0.007
ξ	Leonis	5.1	9	27	28.447	-0.0063	11	40	4.89	-0.084
h	Leonis	5.2	9	27	30.786	+0.0001	10	4	56.78	-0.013
o	Leonis	3.8	9	36	43.370	-0.0096	10	16	14.25	-0.033
83 B.	Leonis	5.9	9	52	2.016	-0.0075	+ 9	19	37.42	+0.017
89 B.	Leonis	6.2	9	53	43.926	+0.0010	8	42	38.46	-0.029
π	Leonis	4.9	9	55	49.720	-0.0029	8	26	34.70	-0.027
14	Sextantis	6.3	10	2	27.099	-0.0022	6	1	0.98	-0.002
43	Leonis	6.3	10	18	39.932	-0.0017	6	57	52.26	-0.101
155 B.	Leonis	6.5	10	18	56.009	-0.0167	+ 6	6	56.43	-0.071
35	Sextantis	6.1	10	39	2.515	+0.0018	5	11	1.26	-0.019
237 B.	Leonis	6.3	10	47	57.895	+0.0002	1	27	55.02	-0.055
55	Leonis	6.1	10	51	26.255	+0.0073	1	10	46.69	-0.013
p <sup>3</sup>	Leonis	6.1	10	59	21.719	-0.0045	0	26	47.06	+0.006
p <sup>4</sup>	Leonis	5.7	11	2	40.246	-0.0253	+ 2	24	23.26	-0.080
p <sup>5</sup>	Leonis	5.3	11	9	30.665	-0.0029	0	22	56.19	-0.003
359 B.	Leonis	6.3	11	19	2.972	-0.0024	+ 0	35	16.21	-0.015
388 B.	Leonis	6.3	11	23	39.253	-0.0025	- 1	14	34.43	+0.007
e	Leonis	5.1	11	26	4.456	+0.0018	2	32	42.85	-0.009
431 B.	Leonis	6.2	11	34	9.581	-0.0028	- 1	58	37.02	+0.047
13 B.	Virginis	5.9	11	46	47.658	+0.0008	4	52	17.75	+0.006
64 B.	Virginis	6.5	12	6	11.672	-0.0004	7	18	45.30	+0.017
78 B.	Virginis	6.5	12	10	0.320	-0.0051	5	15	27.62	+0.114
q	Virginis	5.3	12	29	29.633	-0.0057	8	59	39.19	+0.004
370 B.	Virginis	6.0	12	49	59.434	-0.0058	-11	11	55.66	-0.037
69	Virginis	4.9	13	23	1.377	-0.0086	15	32	36.72	+0.013
75	Virginis	5.6	13	28	25.411	-0.0050	14	56	10.72	+0.004
83	Virginis	5.6	13	40	0.939	+0.0007	15	45	43.43	-0.011
85	Virginis	6.1	13	41	6.770	-0.0029	15	21	3.19	-0.034
87	Virginis	5.8	13	42	54.232	+0.0025	-17	26	41.30	-0.046
89	Virginis	5.1	13	45	21.487	-0.0077	17	43	16.12	-0.040
214 G.	Virginis	6.5	14	0	42.318	-0.0036	15	56	20.31	-0.012
43 H.	Virginis	5.5	14	10	49.466	-0.0031	17	48	50.20	-0.015
231 G.	Virginis	6.4	14	12	28.259	-0.0005	18	12	0.11	+0.106
236 G.	Virginis	5.7	14	14	2.704	-0.0039	-18	19	54.48	-0.001
9 G.	Libræ	6.5	14	30	10.364	+0.0032	20	4	32.31	-0.004
17 G.	Libræ	6.4	14	41	28.209	-0.0047	20	49	28.80	-0.121
18 G.	Libræ	6.1	14	42	30.284	-0.0032	20	58	38.29	-0.014
43 B.	Libræ	5.7	14	52	36.945	+0.0746	21	2	32.52	-1.792
47 G.	Libræ	6.1	15	1	39.657	+0.0086	-21	42	34.40	-0.050
64 G.	Libræ	5.8	15	11	34.108	-0.0028	22	5	34.49	+0.018
153 B.	Libræ	6.3	15	28	14.106	-0.0006	24	12	29.89	-0.042
169 B.	Libræ	6.0	15	32	55.078	-0.0017	22	52	0.86	-0.068
177 B.	Libræ	6.2	15	34	28.253	-0.0016	22	52	46.25	-0.034
42	Libræ	5.0	15	35	22.266	-0.0018	-23	32	56.98	-0.027
A	Scorpii	4.6	15	48	37.514	-0.0017	25	4	48.20	-0.023
31 B.	Scorpii	5.4	15	48	56.179	-0.0022	24	17	12.36	-0.037
32 B.	Scorpii	5.3	15	48	59.250	-0.0023	23	43	53.18	-0.016
3	Scorpii	5.9	15	49	40.271	-0.0031	-24	59	54.58	-0.029

MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.			Annual Proper Motion.
			h	m	s	s	°	'	"	"
40 B.	Scorpii . . .	5.4	15	53	35.970	-0.0031	-24	35	33.59	+0.004
δ	Scorpii . . .	2.5	15	55	25.331	-0.0012	22	23	11.19	-0.035
48 B.	Scorpii . . .	4.9	15	58	19.493	-0.0048	25	38	5.25	-0.043
50 B.	Scorpii . . .	6.4	15	58	55.524	+0.0017	24	29	53.90	-0.032
57 B.	Scorpii . . .	5.7	16	1	9.190	-0.0011	23	22	50.27	-0.006
24 G.	Scorpii . . .	6.2	16	2	52.845	0.0000	-24	14	27.16	-0.068
27 G.	Scorpii . . .	5.8	16	3	46.260	+0.0032	23	27	52.47	-0.012
41 G.	Scorpii . . .	6.3	16	8	45.844	-0.0004	24	12	38.64	-0.084
85 B.	Scorpii . . .	6.0	16	9	51.473	-0.0005	25	16	1.31	+0.012
19	Scorpii . . .	4.9	16	15	38.310	-0.0012	23	58	12.35	-0.013
σ	Scorpii . . .	3.1	16	16	8.421	-0.0011	-25	23	40.82	-0.039
ρ	Ophiuchi . . .	4.7	16	20	36.261	-0.0015	23	15	22.79	-0.008
α	Scorpii ( <i>Antares</i> ) . . .	1.2	16	24	18.923	-0.0006	26	14	55.76	-0.028
22	Scorpii . . .	4.8	16	25	9.754	-0.0004	24	55	59.86	-0.016
116 B.	Scorpii . . .	6.2	16	26	17.073	-0.0013	26	21	28.40	-0.037
126 B.	Scorpii . . .	6.1	16	36	34.259	-0.0024	-24	18	28.39	-0.004
24	Ophiuchi . . .	5.5	16	51	47.594	+0.0002	23	1	10.92	-0.034
88 B.	Ophiuchi . . .	6.3	16	54	52.692	+0.0005	24	58	1.46	-0.015
26	Ophiuchi . . .	5.8	16	55	4.318	+0.0036	24	51	47.95	-0.053
118 B.	Ophiuchi . . .	6.2	17	1	44.501	-0.0008	26	24	6.72	-0.046
137 B.	Ophiuchi . . .	6.3	17	7	7.937	+0.0058	-25	9	12.73	-0.045
36	Ophiuchi ( <i>First Star</i> ) . . .	5.4	17	10	14.447	-0.0369	26	28	55.83	-1.169
39	Ophiuchi . . .	5.1	17	12	56.852	-0.0046	24	11	51.01	-0.011
θ	Ophiuchi . . .	3.4	17	16	54.620	-0.0006	24	55	4.13	-0.086
191 B.	Ophiuchi . . .	6.3	17	20	1.734	+0.0010	24	10	7.19	+0.017
b	Ophiuchi . . .	4.3	17	21	17.948	-0.0009	-24	6	0.68	-0.137
136 G.	Ophiuchi . . .	6.3	17	21	47.060	-0.0010	25	52	15.11	-0.003
51	Ophiuchi . . .	4.8	17	26	21.022	0.0000	23	53	58.09	-0.080
151 G.	Ophiuchi . . .	6.0	17	26	35.150	+0.0012	26	12	25.23	-0.026
63	Ophiuchi . . .	6.1	17	49	47.596	-0.0001	24	52	17.96	-0.015
4	Sagittarii . . .	4.8	17	54	43.475	+0.0001	-23	48	34.52	-0.058
21 G.	Sagittarii . . .	5.7	17	56	52.623	-0.0013	22	46	45.50	-0.044
7	Sagittarii . . .	5.5	17	57	45.883	-0.0003	24	16	57.22	-0.007
9	Sagittarii . . .	6.0	17	58	47.035	-0.0006	24	21	48.31	-0.006
1	Sagittarii . . .	5.2	18	6	39.480	+0.0018	23	43	9.19	-0.042
67 B.	Sagittarii . . .	6.4	18	13	33.366	-0.0044	-25	38	12.95	-0.062
70 B.	Sagittarii . . .	6.4	18	16	24.841	+0.0014	24	57	12.94	-0.001
λ	Sagittarii . . .	2.9	18	22	50.911	-0.0033	25	28	7.64	-0.199
24	Sagittarii . . .	5.7	18	28	49.279	-0.0002	24	5	43.14	-0.020
117 B.	Sagittarii . . .	5.8	18	33	27.791	-0.0015	23	34	36.15	-0.020
26	Sagittarii . . .	6.1	18	36	47.917	+0.0021	-23	54	42.11	-0.023
126 B.	Sagittarii . . .	5.7	18	39	43.447	-0.0008	25	5	43.64	-0.041
28	Sagittarii . . .	5.6	18	41	20.326	+0.0018	22	28	47.72	+0.010
30	Sagittarii . . .	6.2	18	45	51.080	-0.0041	22	15	28.83	-0.024
33	Sagittarii . . .	5.8	18	49	2.466	-0.0008	21	27	44.46	-0.015
γ <sup>1</sup>	Sagittarii . . .	5.0	18	49	9.568	+0.0001	-22	50	53.04	-0.022
γ <sup>2</sup>	Sagittarii . . .	5.1	18	50	6.114	+0.0009	22	46	33.42	-0.024
154 B.	Sagittarii . . .	5.9	18	50	59.155	-0.0010	23	16	49.94	-0.021
36	Sagittarii . . .	5.1	18	52	24.529	-0.0010	20	45	57.13	-0.011
ξ	Sagittarii . . .	3.7	18	52	46.722	+0.0023	-21	13	0.46	-0.023

## 568 STARS OCCULTED BY THE MOON, 1917.

MEAN PLACES FOR 1917.0. (January 0<sup>d</sup>.431, Greenwich.)

Name of Star.		Magni- tude.	Right Ascension.			Annual Proper Motion.	Declination.	Annual Proper Motion.
			h	m	s	s	"	"
168 B.	Sagittarii	6.3	18	56	37.599	+0.0005	-22 48 47.45	+0.009
o	Sagittarii	3.9	18	59	42.583	+0.0050	21 51 50.76	-0.063
191 B.	Sagittarii	6.5	19	3	43.633	-0.0011	23 19 19.94	-0.058
π	Sagittarii	3.0	19	4	49.713	-0.0005	21 9 23.62	-0.036
199 B.	Sagittarii	6.4	19	7	30.461	-0.0003	21 47 49.75	-0.040
222 B.	Sagittarii	5.5	19	15	39.745	-0.0016	-22 33 28.51	+0.026
50	Sagittarii	5.5	19	21	22.193	+0.0019	21 56 30.86	+0.001
253 B.	Sagittarii	6.1	19	25	58.579	+0.0026	21 29 8.75	-0.028
266 B.	Sagittarii	6.1	19	31	35.803	+0.0003	19 2 13.39	-0.009
f	Sagittarii	5.1	19	41	31.295	-0.0099	19 57 41.56	-0.088
57	Sagittarii	6.0	19	47	22.702	+0.0001	-19 15 23.95	-0.057
σ	Capricorni	5.5	20	14	36.382	-0.0002	19 22 42.17	-0.006
π	Capricorni	5.2	20	22	34.314	+0.0004	18 29 4.29	-0.002
31 B.	Capricorni	6.4	20	24	3.064	+0.0013	16 1 0.64	+0.019
ρ	Capricorni	5.0	20	24	7.690	-0.0013	18 5 20.02	-0.020
o	Capricorni	5.6	20	25	8.531	+0.0012	-18 51 31.30	-0.081
27 G.	Capricorni	6.2	20	26	25.300	-0.0058	15 20 5.34	-0.092
47 B.	Capricorni	6.2	20	30	50.554	+0.0055	16 48 42.46	-0.033
τ	Capricorni	5.2	20	34	38.003	+0.0006	15 14 47.84	-0.015
61 B.	Capricorni	5.9	20	35	52.876	-0.0032	16 25 12.50	+0.082
94 B.	Capricorni	5.7	20	53	2.004	+0.0046	-16 21 4.93	+0.030
95 B.	Capricorni	5.9	20	54	6.283	....	14 48 15.32	....
ν	Aquarii	4.5	21	5	4.447	+0.0057	11 42 30.02	-0.006
53 B.	Aquarii	6.5	21	11	26.929	+0.0004	13 32 48.83	-0.039
18	Aquarii	5.5	21	19	39.440	+0.0054	13 14 6.00	+0.007
19	Aquarii	5.6	21	20	45.525	+0.0012	-10 6 9.10	-0.164
72 B.	Aquarii	6.5	21	23	44.115	-0.0045	11 55 42.05	+0.008
137 B.	Capricorni	6.2	21	35	0.512	+0.0001	10 57 2.84	-0.010
c <sup>1</sup>	Capricorni	5.3	21	40	34.815	+0.0004	9 27 50.63	+0.008
c <sup>2</sup>	Capricorni	6.3	21	41	50.672	+0.0008	9 39 34.32	+0.001
λ	Capricorni	5.5	21	42	4.124	+0.0015	-11 44 57.30	-0.004
96 B.	Aquarii	6.5	21	49	9.841	-0.0001	10 42 10.48	+0.006
30	Aquarii	5.6	21	58	54.494	+0.0011	6 55 25.82	+0.016
θ	Aquarii	4.3	22	12	27.295	+0.0074	8 11 49.13	-0.018
44	Aquarii	5.7	22	12	46.581	-0.0003	5 48 7.35	+0.029
ρ	Aquarii	5.3	22	15	49.967	+0.0008	- 8 14 18.57	-0.008
170 B.	Aquarii	6.0	22	19	11.092	+0.0012	7 36 51.56	+0.034
51	Aquarii	5.8	22	19	47.505	+0.0011	5 15 26.67	-0.011
186 B.	Aquarii	6.1	22	26	57.266	+0.0129	6 58 45.38	-0.129
187 B.	Aquarii	6.3	22	27	0.907	-0.0051	3 20 11.42	-0.004
κ	Aquarii	5.2	22	33	27.532	-0.0049	- 4 39 23.29	-0.113
207 B.	Aquarii	6.3	22	36	30.325	....	3 59 10.07	....
6 G.	Piscium	6.2	22	53	59.129	+0.0002	2 50 24.24	-0.082
3	Piscium	6.3	22	56	22.554	+0.0028	0 15 36.20	+0.014
22 B.	Piscium	6.4	23	19	16.465	+0.0043	- 0 9 51.61	+0.038
κ	Piscium	4.9	23	22	40.659	+0.0056	+ 0 48 4.07	-0.093
9	Piscium	6.4	23	22	59.697	+0.0032	0 39 59.78	-0.029
16	Piscium	5.7	23	32	9.143	-0.0074	1 38 29.43	+0.057
19	Piscium	5.4	23	42	8.970	-0.0034	3 1 34.68	-0.020
ω	Piscium	4.0	23	55	2.897	+0.0102	+ 6 24 13.92	-0.168

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S					AT CONJUNCTION IN R.A.					Limiting Parallels.			
Name.		Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, $H$ .	$Y'$	$x'$	$y'$	N.	S.	
			$\Delta\alpha$	$\Delta\delta$									
			$s$	$''$	$^{\circ}$	$d$	$h$	$m$	$h$	$m$	$^{\circ}$	$^{\circ}$	
7	Piscium	3.7	+1.30	+10.8	+14 55.3	1	5	3.1	- 1 40.8	-0.1227	0.5351	+0.2082	+35 -42
101	Piscium	6.2	1.33	10.6	14 14.4	7	5	4	+ 0 17.6	+1.0164	0.5357	0.2055	+90 +21
105	Piscium	6.1	1.35	11.1	15 59.3	8	55	4	+ 2 4.0	-0.4510	0.5361	0.2029	+17 -60
3	Arietis	6.4	1.40	11.4	17 0.1	12	10	6	+ 5 12.8	-0.8678	0.5370	0.1981	- 7 -73
4	Arietis	5.8	1.41	11.2	16 32.8	12	55	9	+ 5 56.6	-0.2387	0.5372	0.1970	+29 -47
1	Arietis	5.1	+1.47	+11.4	+17 25.0	17	14	0	+10 6.3	-0.3255	0.5383	+0.1905	+24 -51
35 B.	Arietis	6.4	1.51	11.5	17 51.5	20	12	5	-11 1.1	-0.2344	0.5392	0.1858	+29 -46
47 B.	Arietis	6.5	1.54	11.4	17 38.3	22	6	3	- 9 11.0	+0.3488	0.5398	0.1828	+62 -15
20 H <sup>1</sup> .	Arietis	6.4	1.54	11.1	16 50.3	22	51	6	- 8 27.1	+1.3349	0.5400	0.1815	+72 +60
15	Arietis	5.9	1.56	11.8	19 6.7	23	25	2	- 7 54.6	-0.9777	0.5402	0.1806	-15 -71
0	Arietis	5.6	+1.61	+11.8	+19 31.3	2	2	54.5	- 4 32.3	-0.7937	0.5413	+0.1747	- 3 -70
26	Arietis	6.2	1.69	11.6	19 29.5	8	41	6	+ 1 3.2	+0.2196	0.5431	0.1646	+54 -19
$\mu$	Arietis	5.7	1.76	11.4	19 39.7	14	5	2	+ 6 16.0	+0.8998	0.5448	0.1548	+90 +19
47	Arietis	5.8	1.86	11.2	20 20.4	21	15	0	-10 48.7	+1.2370	0.5470	0.1410	+87 +49
$\epsilon$	Arietis (mean)	4.6	1.88	11.3	21 0.7	21	45	9	-10 18.8	-0.5885	0.5472	0.1400	+83 + 3
66	Arietis	6.1	+2.06	+10.7	+22 31.3	3	10	57.2	+ 2 25.5	+0.6384	0.5510	+0.1129	+89 + 8
7	Tauri	5.9	2.11	11.0	24 11.4	13	37	3	+ 5 0.0	-0.8679	0.5517	0.1072	- 9 -66
16	Tauri	5.4	2.17	10.5	24 1.9	18	15	4	+ 9 28.6	-0.2250	0.5528	0.0971	+29 -36
17	Tauri	3.8	2.17	10.5	23 51.4	18	17	5	+ 9 30.6	-0.0314	0.5528	0.0970	+40 -25
18	Tauri	5.6	2.18	10.7	24 35.0	18	24	5	+ 9 37.4	-0.8057	0.5528	0.0967	- 5 -65
7	Tauri	4.3	+2.17	+10.6	+24 12.7	18	26	1	+ 9 38.9	-0.4011	0.5528	+0.0967	+19 -46
20	Tauri	4.1	2.17	10.5	24 6.7	18	42	7	+ 9 55.0	-0.2677	0.5529	0.0961	+26 -38
21	Tauri	5.8	2.18	10.6	24 18.0	18	44	7	+ 9 56.9	-0.4667	0.5529	0.0960	+15 -50
22	Tauri	6.5	2.18	10.6	24 16.4	18	48	5	+10 0.6	-0.4321	0.5529	0.0958	+17 -48
23	Tauri	4.3	2.17	10.4	23 41.6	18	56	5	+10 8.3	+0.2071	0.5529	0.0955	+54 -13
7	Tauri	3.0	+2.18	+10.4	+23 51.1	19	27	3	+10 38.0	+0.0843	0.5531	+0.0944	+46 -19
104 B.	Tauri	5.5	2.18	10.2	23 10.2	19	51	0	+11 0.9	+0.8595	0.5532	0.0935	+90 +23
27	Tauri	3.7	2.19	10.3	23 48.2	20	12	3	+11 21.4	+0.2073	0.5532	0.0928	+54 -12
28	Tauri	5.2	2.19	10.3	23 53.2	20	12	8	+11 21.9	+0.1178	0.5532	0.0927	+49 -17
36	Tauri	5.6	2.27	9.6	23 52.9	4	2	58.0	- 6 6.8	+0.7002	0.5545	0.0775	+90 +16
$\chi$	Tauri	5.3	+2.38	+ 9.1	+25 26.2	11	1	1.2	+ 1 39.5	-0.4397	0.5557	+0.0588	+17 -45
62	Tauri	6.1	2.37	8.7	24 6.7	11	40	1	+ 2 17.1	+1.0402	0.5558	0.0574	+90 +39
315 B.	Tauri	6.3	2.52	7.1	24 27.8	1	55	9	- 7 57.0	+1.2419	0.5564	0.0238	+80 +61
$k$	Tauri	5.6	2.53	7.1	24 55.5	2	45	6	- 7 9.0	+0.7556	0.5564	+0.0218	+90 +24
118	Tauri	5.4	2.64	5.2	25 5.1	16	33	3	+ 6 9.8	+0.6574	0.5552	-0.0109	+90 +20
125	Tauri	5.1	+2.69	+ 4.7	+25 51.2	21	12	2	+10 39.1	-0.2605	0.5544	-0.0218	+27 -30
132	Tauri	5.0	2.69	3.9	24 32.5	6	1	22.6	- 9 19.2	+1.0691	0.5535	0.0316	+90 +44
412 B.	Tauri	5.8	2.70	3.4	24 14.4	4	56	2	- 5 52.9	+1.2756	0.5527	0.0397	+66 +65
139	Tauri	4.7	2.74	3.5	25 56.7	5	22	9	- 5 27.1	-0.6195	0.5526	0.0408	+ 6 -56
5	Geminorum	5.9	2.74	2.4	24 26.4	11	31	3	+ 0 28.7	+0.7449	0.5508	0.0547	+90 +20
8	Geminorum	6.1	+2.74	+ 2.1	+23 59.9	13	41	8	+ 2 34.8	+1.1080	0.5501	-0.0596	+90 +44
52 B.	Geminorum	6.5	2.78	0.7	24 39.7	23	20	8	+11 54.2	-0.2991	0.5465	0.0806	+24 -38
$\epsilon$	Geminorum	3.2	2.80	+ 0.3	25 12.9	7	2	19.6	- 9 13.0	-1.1606	0.5454	0.0869	-34 -65
87 B.	Geminorum	5.8	2.78	- 0.4	23 42.0	6	5	8	- 5 34.2	+0.1698	0.5437	0.0947	+52 -14
$\omega$	Geminorum	5.2	2.80	1.1	24 20.1	10	57	0	- 0 52.7	-1.0150	0.5415	0.1045	-20 -66
44	Geminorum	5.9	+2.76	- 1.3	+22 45.7	12	20	2	+ 0 27.7	+0.5781	0.5409	-0.1072	+82 + 5
6	Geminorum	3.5	2.76	2.3	22 8.1	19	21	6	+ 7 15.6	+0.4714	0.5375	0.1207	+72 - 2
58	Geminorum	6.0	2.77	2.5	23 6.3	20	56	4	+ 8 47.2	-0.7960	0.5367	0.1237	- 4 -67
149 B.	Geminorum	6.4	2.74	2.8	21 42.1	22	35	4	+10 23.0	+0.5526	0.5358	0.1267	+80 + 2
63	Geminorum	5.3	2.74	2.8	21 36.9	23	0	7	+10 47.5	+0.5948	0.5356	0.1275	+84 + 4
79	Geminorum	6.3	+2.71	- 3.9	+20 30.9	8	7	27.0	- 5 2.2	+0.6762	0.5313	-0.1424	+90 + 7

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
209 B. Geminorum	6.2	+2.69	-4.3	+19 32.9	8 10 47.4	-1 48.1	+1.2766	0.5296	-0.1480	+82	+53
85 Geminorum	5.2	2.69	4.6	20 6.2	12 36.5	-0 2.4	+0.3775	0.5285	0.1509	+65	-10
217 B. Geminorum	6.3	2.69	4.9	20 2.6	15 8.6	+2 25.0	+0.0557	0.5272	0.1550	+45	-27
SATURN	-0.1	...	...	20 47.1	17 4.1	+4 16.9	-1.0702	0.5300	0.1589	-22	-69
10 H. Cancrī	6.1	2.67	5.1	19 4.6	17 7.4	+4 20.0	+0.8200	0.5262	0.1581	+90	+13
d <sup>1</sup> Cancrī	5.9	+2.63	-6.2	+18 35.9	9 2 28.0	-10 36.5	-0.1914	0.5213	-0.1719	+31	-42
d <sup>2</sup> Cancrī	6.2	2.61	6.3	17 19.1	3 44.6	-9 22.2	+1.0090	0.5206	0.1737	+90	+24
NEPTUNE	7.7	...	...	19 3.4	5 30.5	-7 39.5	-1.2299	0.5210	0.1764	-37	-71
θ Cancrī	5.5	2.61	6.7	18 22.4	6 39.3	-6 32.7	-0.6747	0.5191	0.1776	+5	-71
54 Cancrī	6.3	2.53	7.5	15 39.4	16 42.5	+3 12.6	+0.4938	0.5141	0.1904	+73	-9
o <sup>1</sup> Cancrī	5.1	+2.51	-7.9	+15 38.4	19 56.8	+6 21.2	-0.1093	0.5126	-0.1941	+36	-41
o <sup>2</sup> Cancrī	5.7	2.52	7.9	15 53.9	20 7.2	+6 31.3	-0.4307	0.5125	0.1943	+18	-59
81 Cancrī	6.4	2.47	8.6	15 19.7	10 3 54.3	-9 55.2	-1.3429	0.5090	0.2027	-51	-72
ξ Leonis	5.1	2.36	9.0	11 39.9	14 25.9	+0 18.5	+0.5423	0.5047	0.2125	+76	-10
o Leonis	3.8	2.32	9.2	10 16.1	19 25.4	+5 9.5	+1.0232	0.5029	0.2166	+90	+18
83 B. Leonis	5.9	+2.26	-9.7	+9 19.5	11 3 45.4	-10 44.4	+0.2399	0.5003	-0.2226	+55	-27
89 B. Leonis	6.2	2.25	9.6	8 42.5	4 41.2	-9 50.1	+0.7167	0.5001	0.2232	+90	-2
π Leonis	4.9	2.24	9.7	8 26.4	5 50.1	-8 43.1	+0.7569	0.4997	0.2240	+90	+1
43 Leonis	6.3	2.14	10.2	6 57.7	18 25.1	+3 31.1	-0.4680	0.4970	0.2309	+17	-68
155 B. Leonis	6.5	2.13	10.0	6 6.8	18 34.0	+3 39.8	+0.4380	0.4969	0.2309	+68	-18
35 Sextantis	6.1	+2.05	-10.4	+5 10.8	12 5 43.6	-9 29.0	-1.1330	0.4955	-0.2352	-23	-85
p <sup>4</sup> Leonis	5.7	1.93	10.4	2 24.2	18 52.4	+3 18.3	-1.1781	0.4954	0.2381	-26	-88
p <sup>5</sup> Leonis	5.3	1.89	10.0	0 22.8	22 40.4	+7 0.2	+0.1457	0.4956	0.2386	+50	-34
359 B. Leonis	6.3	1.85	10.2	+0 35.1	13 3 57.7	-11 51.2	-1.3419	0.4962	0.2388	-44	-85
388 B. Leonis	6.3	1.83	9.8	-1 14.7	6 30.6	-9 22.4	+0.0613	0.4965	0.2388	+45	-38
e Leonis	5.1	+1.80	-9.4	-2 32.9	7 50.8	-8 4.4	+1.1716	0.4967	-0.2387	+87	+26
431 B. Leonis	6.2	1.78	9.7	1 58.8	12 18.2	-3 44.4	-0.5153	0.4975	0.2384	+15	-73
13 B. Virginis	5.9	1.71	9.0	4 52.4	19 13.7	+2 59.7	+1.0047	0.4993	0.2373	+85	+14
64 B. Virginis	6.5	1.62	8.5	7 18.9	14 5 44.9	-10 46.9	+1.1808	0.5028	0.2344	+83	+27
q Virginis	5.3	1.50	8.2	8 59.8	18 8.8	+1 15.8	+0.1290	0.5084	0.2288	+47	-35
370 B. Virginis	6.0	+1.41	-7.6	-11 12.1	15 4 48.0	+11 36.3	+0.1061	0.5145	-0.2219	+44	-36
69 Virginis	4.9	1.25	6.2	15 32.7	21 23.8	+3 41.8	+1.1885	0.5260	0.2073	+74	+30
75 Virginis	5.6	1.23	6.4	14 56.3	16 0 2.3	+6 15.3	-0.0036	0.5281	0.2044	+35	-42
83 Virginis	5.6	1.17	6.1	15 45.8	5 38.4	+11 40.7	-0.2521	0.5326	0.1979	+22	-56
85 Virginis	6.1	1.17	6.2	15 21.2	6 9.9	-11 48.8	-0.7922	0.5330	0.1973	-8	-90
87 Virginis	5.8	+1.16	-5.5	-17 26.8	7 1.2	-10 59.2	+1.2609	0.5337	-0.1963	+73	+39
89 Virginis	5.1	1.15	5.4	17 43.4	8 11.3	-9 51.4	+1.3245	0.5347	0.1948	+72	+50
43 H. Virginis	5.5	1.03	5.4	17 48.9	20 3.6	+1 37.5	-0.7965	0.5452	0.1782	-10	-90
231 G. Virginis	6.4	1.02	5.3	18 12.1	20 48.7	+2 21.0	-0.5236	0.5459	0.1770	+5	-75
236 G. Virginis	5.7	1.02	5.2	18 20.0	21 31.7	+3 2.5	-0.5115	0.5465	0.1759	+5	-74
9 G. Libræ	6.5	+0.94	-4.6	-20 4.6	17 4 46.7	+10 2.6	+0.0852	0.5534	-0.1639	+35	-37
17 G. Libræ	6.4	0.89	4.3	20 49.6	9 45.1	-9 9.5	+0.0737	0.5581	0.1549	+33	-37
18 G. Libræ	6.1	0.89	4.3	20 58.7	10 12.2	-8 43.3	+0.1630	0.5585	0.1541	+38	-32
43 B. Libræ	5.7	0.85	4.3	21 2.6	14 34.7	-4 30.2	-0.4249	0.5627	0.1457	+6	-69
47 G. Libræ	6.1	0.80	4.0	21 42.6	18 26.4	-0 47.0	-0.2792	0.5664	0.1378	+13	-58
64 G. Libræ	5.8	+0.76	-3.8	-22 5.6	22 36.7	+3 14.1	-0.4383	0.5704	-0.1289	+4	-70
153 B. Libræ	6.3	0.69	3.1	24 12.6	18 5 30.4	+9 52.4	+0.9048	0.5768	0.1133	+66	+12
169 B. Libræ	6.0	0.67	3.5	22 52.1	7 25.0	+11 42.6	-0.6857	0.5785	0.1088	-12	-90
177 B. Libræ	6.2	0.66	3.5	22 52.8	8 2.9	-11 41.0	-0.7406	0.5791	0.1073	-15	-90
42 Libræ	5.0	0.66	3.3	23 33.0	8 24.8	-11 19.9	-0.0924	0.5794	0.1064	+19	-47
4 Scorpii	4.6	+0.61	-2.8	-25 4.9	13 44.7	-6 12.3	+0.9414	0.5841	-0.0932	+65	+14



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
		s	"	° ' "	d h m	h m				° ' "	° ' "
31 B. Scorpii	5.4	+0.60	-3.1	24 17.3	18 13 52.2	- 6 5.1	+0.1189	0.5842	-0.0929	+29	-35
32 B. Scorpii	5.3	0.60	3.2	23 43.9	13 53.4	- 6 4.0	-0.4506	0.5842	0.0928	- 1	-71
3 Scorpii	5.9	0.60	2.8	25 0.0	14 9.8	- 5 48.3	+0.8191	0.5845	0.0921	+65	+ 6
40 B. Scorpii	5.4	0.59	3.0	24 35.6	15 43.5	- 4 18.2	+0.2632	0.5858	0.0881	+36	-27
48 B. Scorpii	4.9	0.57	2.6	25 38.1	17 35.8	- 2 30.3	+1.1652	0.5874	0.0832	+64	+35
50 B. Scorpii	6.4	+0.56	-3.0	24 29.9	17 50.0	- 2 16.7	-0.0131	0.5876	-0.0826	+21	-42
57 B. Scorpii	5.7	0.56	3.3	23 22.9	18 42.7	- 1 26.1	-1.2232	0.5883	0.0803	-55	-86
24 G. Scorpii	6.2	0.55	3.0	24 14.5	19 23.4	- 0 47.0	-0.4006	0.5888	0.0785	0	-67
27 G. Scorpii	5.8	0.54	3.4	23 27.9	19 44.4	- 0 26.9	-1.2181	0.5892	0.0775	-54	-86
41 G. Scorpii	6.3	0.53	3.0	24 12.7	21 41.8	+ 1 25.8	-0.6043	0.5907	0.0723	-11	-86
85 B. Scorpii	6.0	+0.52	-2.7	25 16.1	22 7.4	+ 1 50.4	+0.4388	0.5910	-0.0711	+45	-17
19 Scorpii	4.9	0.50	3.1	23 58.3	19 0 22.3	+ 4 0.0	-1.0309	0.5927	0.0649	-38	-90
$\sigma$ Scorpii	3.1	0.50	2.7	25 23.7	0 34.0	+ 4 11.2	+0.4021	0.5929	0.0644	+43	-19
$\alpha$ Scorpii	1.2	0.47	2.4	26 15.0	3 43.5	+ 7 13.0	+1.0769	0.5952	0.0556	+64	+26
22 Scorpii	4.8	0.46	2.8	24 56.0	4 3.0	+ 7 31.7	-0.2731	0.5954	0.0547	+ 5	-58
116 B. Scorpii	6.2	+0.46	-2.4	26 21.5	4 28.9	+ 7 56.5	+1.1455	0.5957	-0.0534	+64	+34
126 B. Scorpii	6.1	0.42	2.9	24 18.5	8 25.0	+11 43.0	-1.1146	0.5984	0.0421	-47	-90
88 B. Ophiuchi	6.3	0.36	2.7	24 58.1	15 20.6	- 5 38.6	-0.6677	0.6024	0.0216	-19	-90
26 Ophiuchi	5.8	0.36	2.7	24 51.8	15 25.0	- 5 34.4	-0.7735	0.6025	0.0214	-25	-90
118 B. Ophiuchi	6.2	0.34	2.4	26 24.2	17 55.2	- 3 10.5	+0.7274	0.6038	0.0138	+64	+ 1
137 B. Ophiuchi	6.3	+0.32	-2.6	25 9.3	19 56.1	- 1 14.5	-0.5461	0.6047	-0.0076	-14	-80
36 Ophi. (1st sta.)	5.4	0.31	2.4	26 29.0	21 5.7	- 0 7.8	+0.7780	0.6052	-0.0041	+64	+ 4
9 Ophiuchi	3.4	0.29	2.7	24 55.1	23 34.6	+ 2 14.8	-0.7882	0.6062	+0.0035	-27	-90
136 G. Ophiuchi	6.3	0.28	2.5	25 52.3	20 1 23.1	+ 3 58.7	+0.1761	0.6069	0.0091	+25	-31
151 G. Ophiuchi	6.0	0.26	2.4	26 12.5	3 9.8	+ 5 40.9	+0.5325	0.6075	0.0147	+47	-11
63 Ophiuchi	6.1	+0.20	-2.6	24 52.3	11 43.5	-10 7.2	-0.5570	0.6095	+0.0414	-11	-81
7 Sagittarii	5.5	0.18	2.7	24 17.0	14 39.4	- 7 18.9	-1.0057	0.6099	0.0505	-38	-90
9 Sagittarii	6.0	0.18	-2.7	24 21.9	15 1.8	- 6 57.3	-0.9062	0.6099	0.0517	-31	-90
NEW MOON.											
$\rho$ Aquarii	5.3	+0.18	+0.1	8 14.3	24 20 2.6	- 5 57.0	+1.3338	0.5593	+0.2586	+81	+44
170 B. Aquarii	6.0	0.19	0.2	7 36.9	21 30.7	- 4 32.1	+1.0994	0.5585	0.2594	+82	+20
51 Aquarii	5.8	0.18	0.7	5 15.4	21 46.7	- 4 16.6	-1.1554	0.5583	0.2595	-26	-90
186 B. Aquarii	6.1	0.21	0.5	6 58.7	25 0 55.8	- 1 14.1	+1.3641	0.5566	0.2609	+78	+49
$\kappa$ Aquarii	5.2	0.22	1.0	4 39.4	3 48.5	+ 1 32.5	-0.1774	0.5551	0.2620	+32	-51
207 B. Aquarii	6.3	+0.22	+1.2	3 59.1	5 9.7	+ 2 50.9	-0.4857	0.5544	+0.2624	+16	-71
6 G. Piscium	6.2	0.28	1.8	2 50.4	12 59.1	+10 24.1	+0.4378	0.5508	0.2638	+67	-19
22 B. Piscium	6.4	0.36	2.9	0 9.8	26 0 27.6	- 2 30.8	+0.8016	0.5465	0.2628	+90	+ 1
$\kappa$ Piscium	4.9	0.37	3.2	0 48.1	2 1.1	- 1 0.5	+0.2459	0.5460	0.2625	+55	-29
9 Piscium	6.4	0.37	3.2	0 40.0	2 9.8	- 0 52.0	+0.4186	0.5460	0.2624	+66	-20
16 Piscium	5.7	+0.40	+3.6	+ 1 38.6	6 21.9	+ 3 11.5	+0.5434	0.5447	+0.2611	+75	-13
19 Piscium	5.4	0.44	4.1	3 1.6	10 58.3	+ 7 38.7	+0.3524	0.5435	0.2590	+62	-23
36 Piscium	6.2	0.57	6.0	7 46.9	20 0 57.0	- 2 50.3	-0.8862	0.5412	0.2501	- 6	-82
$d$ Piscium	5.4	0.59	6.0	7 43.9	2 49.4	- 1 1.6	-0.3690	0.5410	0.2486	+22	-61
136 B. Piscium	6.5	0.69	6.7	8 54.2	12 24.7	+ 8 14.6	+0.7796	0.5405	0.2397	+90	+ 2
58 Piscium	5.7	+0.72	+7.6	+11 31.4	15 6.5	+10 51.1	-1.2581	0.5404	+0.2368	-35	-78
75 Piscium	6.3	0.82	8.1	12 30.8	28 0 11.4	- 4 22.1	-0.1754	0.5408	0.2263	+32	-47
$\eta$ Piscium	3.7	0.97	9.0	14 55.3	11 43.7	+ 6 47.2	-0.1429	0.5419	0.2107	+34	-43
101 Piscium	6.2	1.00	8.8	14 14.4	13 43.0	+ 8 42.6	+0.9810	0.5422	0.2078	+90	+19
105 Piscium	6.1	1.02	9.5	15 59.3	15 30.3	+10 26.3	-0.4678	0.5424	0.2051	+16	-61
3 Arietis	6.4	+1.06	+9.8	+17 0.0	18 40.9	-10 29.4	-0.8802	0.5429	+0.2002	- 7	-73



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JANUARY.

THE STAR'S						AT CONJUNCTION IN R. A.						Limiting Par- allels.	
	Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.	
			$\Delta\alpha$	$\Delta\delta$									
			<i>s</i>	<i>"</i>	<i>s</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i>	<i>m</i>	<i>s</i>	<i>"</i>	
4	Arietis	5.8	+1.08	+9.6	+16 32.7	28	19	25.1	-9 46.7	-0.2589	0.5430	+0.1991	+27 -48
<i>z</i>	Arietis	5.1	1.13	9.9	17 24.9		23	37.6	-5 42.6	-0.3455	0.5437	0.1922	+23 -52
35 B.	Arietis	6.4	1.18	10.0	17 51.5	29	2	32.5	-2 53.6	-0.2559	0.5442	0.1874	+28 -47
47 B.	Arietis	6.5	1.20	9.9	17 38.2		4	24.0	-1 5.8	+0.3208	0.5446	0.1843	+61 -16
20 H.	Arietis	6.4	1.21	9.5	16 50.3		5	8.4	-0 22.9	+1.2960	0.5447	0.1829	+82 +51
15	Arietis	5.9	+1.22	+10.4	+19 6.7		5	41.4	+0 9.0	-0.9919	0.5448	+0.1820	-16 -71
$\theta$	Arietis	5.6	1.28	10.5	19 31.2		9	6.9	+3 27.5	-0.8106	0.5455	0.1760	-4 -70
26	Arietis	6.2	1.36	10.3	19 29.4		14	48.2	+8 57.3	+0.1920	0.5466	0.1656	+53 -21
$\mu$	Arietis	5.7	1.44	10.2	19 39.7		20	7.1	-9 54.6	+0.8661	0.5477	0.1555	+90 +17
47	Arietis	5.8	1.55	10.2	20 20.4	30	3	11.6	-3 4.7	+1.2012	0.5491	0.1415	+90 +45
$\epsilon$	Arietis ( <i>mean</i> )	4.6	+1.56	+10.4	+21 0.7		3	42.2	-2 35.1	+0.5575	0.5492	+0.1404	+80 +1
66	Arietis	6.1	1.77	10.2	22 31.3		16	46.6	+10 2.4	+0.6079	0.5516	0.1130	+86 +7
7	Tauri	5.9	1.82	10.6	24 11.4		19	25.8	-11 24.0	-0.8902	0.5520	0.1072	-11 -66
16	Tauri	5.4	1.89	10.2	24 1.9	31	0	2.5	-6 56.9	-0.2508	0.5526	0.0970	+27 -37
17	Tauri	3.8	1.89	10.2	23 51.4		0	4.5	-6 55.0	-0.0581	0.5527	0.0970	+38 -26
18	Tauri	5.6	+1.90	+10.4	+24 35.0		0	11.6	-6 48.2	-0.8289	0.5527	+0.0967	-7 -65
<i>q</i>	Tauri	4.3	1.90	10.3	24 12.6		0	13.1	-6 46.7	-0.4260	0.5527	0.0966	+18 -47
20	Tauri	4.1	1.90	10.2	24 6.7		0	29.7	-6 30.6	-0.2933	0.5527	0.0960	+25 -39
21	Tauri	5.8	1.90	10.3	24 18.0		0	31.7	-6 28.7	-0.4914	0.5526	0.0960	+14 -52
22	Tauri	6.5	1.90	10.2	24 16.4		0	35.4	-6 25.0	-0.4570	0.5528	-0.0958	+16 -49
23	Tauri	4.3	+1.90	+10.0	+23 41.6		0	43.4	-6 17.4	+0.1793	0.5528	+0.0955	+52 -14
$\eta$	Tauri	3.0	1.91	10.1	23 51.1		1	14.1	-5 47.8	+0.0570	0.5528	0.0944	+45 -20
104 B.	Tauri	5.5	1.91	9.8	23 10.2		1	37.7	-5 25.0	+0.8289	0.5529	0.0935	+90 +21
27	Tauri	3.7	1.92	10.0	23 48.2		1	58.9	-5 4.6	+0.1795	0.5529	0.0927	+52 -14
28	Tauri	5.2	1.92	10.0	23 53.2		1	59.5	-5 4.0	+0.0905	0.5529	0.0927	+47 -18
36	Tauri	5.6	+2.02	+9.4	+23 52.9		8	43.5	+1 26.0	+0.6710	0.5537	+0.0774	+90 +14
$\chi$	Tauri	5.3	2.16	9.2	25 26.2		16	46.4	+9 12.1	-0.4646	0.5542	0.0589	+15 -47
62	Tauri	6.1	+2.15	+8.7	+24 6.7		17	25.2	+9 49.6	+1.0114	0.5542	+0.0574	+90 +37

FEBRUARY.

315 B.	Tauri	6.3	+2.35	+7.3	+24 27.8	1	7	42.6	-0 22.8	+1.2161	0.5541	+0.0238	+85 +58
k	Tauri	5.6	2.37	7.3	24 55.5		8	32.5	+0 25.3	+0.7305	0.5541	+0.0219	+90 +22
118	Tauri	5.4	2.54	5.6	25 5.2		22	23.8	-10 12.2	+0.6355	0.5524	-0.0106	+90 +18
125	Tauri	5.1	2.61	5.2	25 51.2	2	3	4.1	-5 41.6	-0.2812	0.5515	0.0215	+24 -32
132	Tauri	5.0	+2.63	+4.3	+24 32.5		7	15.9	-1 38.5	+1.0496	0.5506	-0.0311	+90 +42
412 B.	Tauri	5.8	2.66	3.7	24 14.4		10	50.7	+1 49.0	+1.2573	0.5497	0.0393	+76 +62
139	Tauri	4.7	2.70	4.1	25 56.7		11	17.7	+2 15.1	-0.6386	0.5496	0.0403	+5 -58
5	Geminorum	5.9	2.73	2.8	24 26.4		17	28.3	+8 13.1	+0.7284	0.5479	0.0541	+90 +19
8	Geminorum	6.1	2.74	2.4	23 59.9		19	39.6	+10 19.9	+1.0925	0.5472	0.0589	+90 +43
52 B.	Geminorum	6.5	+2.84	+1.1	+24 39.7	3	5	22.2	-4 16.9	-0.3127	0.5439	-0.0798	+24 -39
$\epsilon$	Geminorum	3.2	2.87	+0.8	25 12.9		8	22.0	+1 23.1	-1.1739	0.5427	0.0861	+36 -65
87 B.	Geminorum	5.8	2.86	-0.1	23 42.0		12	9.6	+2 17.0	+0.1593	0.5412	0.0939	+51 -15
$\omega$	Geminorum	5.2	2.91	0.7	24 20.0		17	2.4	+7 0.2	-1.0249	0.5393	0.1036	-21 -66
44	Geminorum	5.9	2.88	1.2	22 45.7		18	25.9	+8 20.9	+0.5705	0.5387	0.1064	+82 +5
$\delta$	Geminorum	3.5	+2.91	-2.4	+22 8.1	4	1	29.6	-8 49.1	+0.4668	0.5356	-0.1199	+72 -2
58	Geminorum	6.0	2.94	2.5	23 6.3		3	4.8	+7 16.9	-0.8014	0.5349	0.1228	-4 -67
149 B.	Geminorum	6.4	2.92	2.9	21 42.1		4	44.2	-5 40.7	+0.5496	0.5341	0.1258	+78 +2
63	Geminorum	5.3	2.92	3.0	21 36.9		5	9.6	-5 16.2	+0.5921	0.5339	0.1266	+83 +4
79	Geminorum	6.3	2.93	4.4	20 30.9		13	37.9	+2 56.1	+0.6776	0.5300	0.1415	+90 +7
209 B.	Geminorum	6.2	+2.92	-5.0	+19 32.2		16	58.9	+6 10.8	+1.2803	0.5284	-0.1471	+81 +53

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m				"	"
SATURN	0.0	...	...	+21 15.0	4 18 45.7	+ 7 54.3	-0.8872	0.5311	-0.1508	- 9	-69
85 Geminorum	5.2	+2.94	- 5.2	20 6.2	18 48.3	+ 7 56.8	+0.3814	0.5276	0.1501	+65	-10
217 B. Geminorum	6.3	2.94	5.5	20 2.6	21 20.9	+10 24.7	+0.0606	0.5264	0.1542	+45	-27
10 H. Cancrī	6.1	2.93	5.9	19 4.5	23 19.9	-11 40.0	+0.8267	0.5254	0.1573	+90	+14
d <sup>1</sup> Cancrī	5.9	2.94	7.2	18 35.9	5 8 41.4	- 2 35.5	-0.1801	0.5211	0.1712	+32	-42
d <sup>2</sup> Cancrī	6.2	+2.92	- 7.5	+17 19.1	9 58.1	- 1 21.2	+1.0220	0.5205	-0.1730	+90	+25
NEPTUNE	7.7	...	...	19 14.2	10 9.0	- 1 10.6	-1.1427	0.5217	0.1736	-28	-71
6 Cancrī	5.5	2.94	7.8	18 22.4	12 53.0	+ 1 28.5	-0.6611	0.5192	0.1770	+ 5	-70
54 Cancrī	6.3	2.90	9.2	15 39.4	22 56.0	+11 13.6	+0.5145	0.5147	0.1899	+75	- 8
o <sup>1</sup> Cancrī	5.1	2.90	9.6	15 38.4	6 2 10.1	- 9 38.0	-0.0865	0.5134	0.1937	+37	-39
o <sup>2</sup> Cancrī	5.7	+2.90	- 9.6	+15 53.9	2 20.5	- 9 27.9	-0.4080	0.5133	-0.1939	+20	-58
81 Cancrī	6.4	2.89	10.5	15 19.7	10 6.8	- 1 55.1	-1.3149	0.5102	0.2024	-45	-75
ξ Leonis	5.1	2.82	11.6	11 39.9	20 36.6	+ 8 16.7	+0.5783	0.5064	0.2125	+79	- 7
o Leonis	3.8	2.79	12.1	10 16.0	7 1 35.1	-10 53.3	+1.0631	0.5048	0.2166	+90	+21
83 B. Leonis	5.9	2.77	12.8	9 19.4	9 53.2	- 2 49.2	+0.2860	0.5024	0.2228	+58	-24
89 B. Leonis	6.2	+2.76	-12.8	+ 8 42.4	10 48.7	- 1 55.2	+0.7636	0.5022	-0.2234	+90	+ 1
π Leonis	4.9	2.75	12.9	8 26.4	11 57.3	- 0 48.5	+0.8047	0.5019	0.2242	+90	+ 3
43 Leonis	6.3	2.70	13.8	6 57.6	8 0 28.9	+11 22.4	-0 4107	0.4994	0.2312	+20	-64
155 B. Leonis	6.5	2.69	13.7	6 6.7	0 37.8	+11 31.0	+0.4957	0.4994	0.2313	+72	-15
35 Sextantis	6.1	2.64	14.4	5 10.8	11 44.5	- 1 40.6	-1.0676	0.4980	0.2356	-18	-85
p <sup>4</sup> Leonis	5.7	+2.57	-14.8	+ 2 24.1	9 0 50.2	+11 3.6	-1.1034	0.4976	-0.2385	-21	-88
p <sup>5</sup> Leonis	5.3	2.54	14.6	0 22.7	4 37.6	- 9 15.2	+0.2251	0.4978	0.2388	+54	-30
359 B. Leonis	6.3	2.52	14.9	+0 35.0	9 54.2	- 4 7.3	-1.2616	0.4982	0.2390	-34	-89
388 B. Leonis	6.3	2.50	14.7	- 1 14.8	12 26.7	- 1 39.0	+0.1464	0.4984	0.2389	+49	-34
e Leonis	5.1	2.49	14.5	2 33.0	13 46.8	- 0 21.0	+1.2601	0.4986	0.2389	+87	+34
431 B. Leonis	6.2	+2.47	-14.8	- 1 58.9	18 14.0	+ 3 58.8	-0.4278	0.4993	-0.2384	+19	-67
13 B. Virginis	5.9	2.42	14.4	4 52.5	10 1 9.6	+10 43.0	+1.1016	0.5006	0.2372	+85	+20
64 B. Virginis	6.5	2.36	14.0	7 19.0	11 42.0	- 3 2.3	+1.2860	0.5035	0.2340	+83	+38
q Virginis	5.3	2.29	13.7	8 59.9	11 0 9.7	+ 9 4.1	+0.2367	0.5081	0.2280	+52	-29
370 B. Virginis	6.0	2.22	13.1	11 12.1	10 54.4	- 4 29.9	+0.2188	0.5131	0.2208	+50	-30
69 Virginis	4.9	+2.12	-11.6	-15 32.8	12 3 43.2	+11 48.6	+1.3174	0.5228	-0.2056	+74	+46
75 Virginis	5.6	2.09	11.8	14 56.4	6 24.4	- 9 35.1	+0.1149	0.5245	0.2027	+41	-35
83 Virginis	5.6	2.05	11.4	15 45.9	12 6.5	- 4 3.6	-0.1350	0.5284	0.1960	+28	-49
85 Virginis	6.1	2.05	11.5	15 21.2	12 38.6	- 3 32.5	-0.6807	0.5288	0.1954	- 1	-90
43 H. Virginis	5.5	1.94	10.3	17 49.0	13 2 50.5	+10 11.9	-0.6847	0.5392	0.1760	- 4	-90
231 G. Virginis	6.4	+1.94	-10.1	-18 12.2	3 36.7	+10 56.6	-0.4085	0.5398	-0.1748	+11	-67
236 G. Virginis	5.7	1.93	10.1	18 20.1	4 20.8	+11 39.2	-0.3962	0.5404	0.1737	+11	-66
9 G. Libræ	6.5	1.87	9.2	20 4.7	11 47.1	- 5 9.4	+0.2083	0.5463	0.1617	+41	-30
17 G. Libræ	6.4	1.83	8.7	20 49.6	16 54.0	- 0 12.9	+0.1964	0.5504	0.1527	+40	-31
18 G. Libræ	6.1	1.83	8.6	20 58.8	17 21.8	+ 0 14.0	+0.2869	0.5508	0.1519	+45	-26
43 B. Libræ	5.7	+1.79	- 8.6	-21 2.7	21 52.2	+ 4 35.0	-0.3100	0.5545	-0.1435	+12	-60
47 G. Libræ	6.1	1.75	8.0	21 42.7	14 1 51.0	+ 8 25.3	-0.1628	0.5578	0.1357	+19	-51
64 G. Libræ	5.8	1.71	7.6	22 5.7	6 9.4	-11 25.5	-0.3252	0.5612	0.1269	+ 9	-61
153 B. Libræ	6.3	1.65	6.5	24 12.6	13 17.0	- 4 33.4	+1.0374	0.5669	0.1115	+66	+22
169 B. Libræ	6.0	1.62	6.9	22 52.1	15 15.6	- 2 39.1	-0.5791	0.5685	0.1070	- 6	-82
177 B. Libræ	6.2	+1.61	- 6.8	-22 52.9	15 54.7	- 2 1.5	-0.6352	0.5690	-0.1055	- 9	-89
42 Libræ	5.0	1.62	6.6	23 33.1	16 17.4	- 1 39.6	+0.0234	0.5693	0.1046	+25	-40
A Scorpī	4.6	1.57	5.7	25 4.9	21 48.8	+ 3 39.4	+1.0726	0.5736	0.0917	+65	+25
31 B. Scorpī	5.4	1.56	6.0	24 17.3	21 56.5	+ 3 46.8	+0.2365	0.5737	0.0914	+35	-28
32 B. Scorpī	5.3	1.56	6.2	23 44.0	21 57.8	+ 3 48.0	-0.3425	0.5737	0.0913	+ 5	-63
3 Scorpī	5.9	+1.56	- 5.7	-25 0.0	22 14.7	+ 4 4.4	+0.9482	0.5739	-0.0906	+65	

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limit- ing Par- allels.
Name.	Mag.	Red'ns from 1910.	Apparent Declina- tion.		Greenwich Mean Time.	Hour Angle. H	$\gamma$	$\gamma'$	$\gamma''$	
		$\Delta\alpha$	$\Delta\delta$		d h m	h m				N. S.
40 B. Scorp	5.4	-1.54	-5.8	-24 35.7	14 23 51.9	-5 37.9	-0.3825	0.5751	-0.0867	-44 -20
50 B. Scorp	6.4	1.52	5.7	24 30.0	15 2 3.0	+7 44.0	-0.1007	0.5767	0.0813	+27 -36
57 B. Scorp	5.7	1.50	6.0	23 22.9	2 57.6	-8 36.6	-1.1300	0.5774	0.0790	-45 -80
24 G. Scorp	6.2	1.50	5.7	24 14.5	3 39.9	-9 17.3	-0.2939	0.5779	0.0772	+6 -60
27 G. Scorp	5.8	1.49	5.9	23 28.0	4 1.6	-9 38.2	-1.1252	0.5751	0.0763	-45 -80
41 G. Scorp	6.3	-1.47	-5.6	-24 12.7	6 3.3	-11 35.2	-0.5019	0.5795	-0.0712	-5 -75
85 B. Scorp	6.0	1.47	5.2	25 10.1	6 29.9	-11 59.2	-0.5587	0.5799	0.0700	-53 -10
19 Scorp	4.9	1.44	5.5	23 58.3	8 49.9	-9 44.7	-0.9370	0.5814	0.0640	-31 -90
c Scorp	3.1	1.44	4.9	25 23.8	9 2.0	-9 33.0	-0.5203	0.5816	0.0635	-50 -12
a Scorp	1.2	1.41	4.4	26 15.0	12 18.7	-6 23.9	-1.2051	0.5837	0.0548	-64 +41
22 Scorp	4.8	-1.40	-4.9	-24 56.1	12 39.0	-6 4.4	-0.1680	0.5839	-0.0539	-10 -52
116 B. Scorp	6.2	1.41	4.4	26 21.5	13 5.8	-5 35.6	-1.2745	0.5842	0.0527	-64 +59
126 B. Scorp	6.1	1.34	4.8	24 18.6	17 10.9	-1 43.2	-1.0262	0.5897	0.0417	-40 -80
88 B. Ophiuch	6.3	1.26	4.2	24 58.1	16 0 22.5	-5 11.3	-0.5754	0.5906	0.0216	-14 -63
28 Ophiuch	5.8	1.26	4.2	24 51.9	0 27.0	-5 15.6	-0.6830	0.5906	0.0214	-20 -80
118 B. Ophiuch	6.2	-1.24	-3.5	-24 24.2	3 2.9	-7 45.2	-0.5420	0.5919	-0.0140	-64 +3
137 B. Ophiuch	6.3	1.21	3.8	25 9.3	5 8.5	-9 45.7	-0.4544	0.5929	0.0080	-9 -72
36 Ophi. 1st star	5.4	1.20	3.4	26 29.0	6 20.7	-10 55.0	-0.8914	0.5934	-0.0046	-63 -12
5 Ophiuch	3.4	1.16	3.7	24 53.1	8 55.3	-10 36.5	-0.7029	0.5944	-0.0029	-23 -80
136 G. Ophiuch	6.3	1.15	3.2	25 52.3	10 47.9	-8 45.5	-0.2764	0.5951	0.0084	-30 -26
151 G. Ophiuch	6.0	-1.13	-3.0	-26 12.5	12 38.6	-7 2.3	-0.6375	0.5957	-0.0138	-56 -5
63 Ophiuch	6.1	1.02	2.9	24 52.3	21 31.2	-1 29.5	-0.4759	0.5980	0.0399	-7 -74
7 Sagittari	5.5	0.98	2.9	24 17.0	0 33.4	-4 23.3	-0.9339	0.5986	0.0489	-33 -90
9 Sagittari	6.0	0.98	2.9	24 21.9	0 56.7	-4 45.7	-0.8330	0.5986	0.0500	-26 -80
67 B. Sagittari	6.4	0.93	2.2	25 38.3	6 33.7	-10 8.8	-0.7749	0.5991	0.0666	-64 +4
70 B. Sagittari	6.4	-0.91	-1.3	-24 57.3	7 38.9	-11 11.4	-0.1628	0.5992	-0.0697	-29 -32
1 Sagittari	2.9	0.86	2.1	25 28.2	10 5.7	-10 22.0	-0.8878	0.5995	0.0769	-65 +9
24 Sagittari	5.7	0.86	2.3	24 5.8	12 21.9	-9 17.4	-0.8358	0.5992	0.0834	-4 -62
117 B. Sagittari	5.8	0.83	2.4	23 34.6	14 7.7	-8 35.9	-0.7023	0.5992	0.0826	-15 -80
21 Sagittari	6.1	0.82	2.2	23 34.7	15 28.8	-5 22.9	-0.2529	0.5991	0.0922	+9 -57
126 B. Sagittari	5.7	-0.82	-1.6	-25 5.5	16 30.6	-4 18.8	-1.0338	0.5990	-0.0954	-65 +22
13 Sagittari	5.0	0.77	2.2	22 50.9	20 6.2	-0 52.2	-0.8473	0.5988	0.1055	-22 -80
13 Sagittari	5.1	0.77	2.2	22 45.8	20 37.7	-0 31.4	-0.8869	0.5985	0.1065	-24 -80
154 B. Sagittari	5.9	0.75	2.6	23 7.9	20 47.6	-0 12.1	-0.8429	0.5985	0.1075	+6 -63
168 B. Sagittari	6.3	0.74	2.1	22 46.8	22 57.1	-1 51.9	-0.5981	0.5981	0.1135	-6 -81
191 B. Sagittari	6.5	-0.72	-1.6	-23 19.4	18 1 39.9	-4 28.0	-0.2555	0.5976	-0.1210	-39 -27
199 B. Sagittari	6.4	-0.70	-1.7	-23 47.9	3 6.5	-5 53.2	-1.0817	0.5972	0.1249	-37 -90
223 B. Sagittari	5.5	0.68	1.7	22 33.5	6 14.4	-8 52.2	-0.7080	0.5965	0.1333	+30 -37
50 Sagittari	5.5	0.65	1.8	22 18.7	8 26.7	-10 37.1	-0.2338	0.5978	0.1391	-15 -55
233 B. Sagittari	6.1	0.64	1.8	22 19.1	10 12.6	-11 20.2	-0.4344	0.5963	0.1437	+5 -69
7 Sagittari	5.1	-0.58	-1.8	-19 57.7	18 13.7	-5 33.6	-1.0286	0.5923	-0.1588	-29 -80
5 Sagittari	5.5	0.49	-1.6	-19 22.7	19 5 12.4	-6 54.0	-0.6566	0.5878	0.1687	-69 -6
NEW MOON.										
36 Pisces	5.1	-0.38	-4.1	-7 49.8	23 11 2.6	-9 3.0	-0.9921	0.5513	-0.2535	-13 -82
6 Pisces	5.4	-0.30	-4.1	-7 49.8	12 11.1	-10 48.1	-0.4593	0.5512	-0.2521	-16 -69
136 B. Pisces	6.5	0.46	6.0	8 34.1	12 11.4	-10 44.7	-0.2933	0.5511	0.2432	-24 -6
75 Pisces	5.5	0.34	6.0	12 30.8	4 24.5	-9 44.7	-0.2582	0.5516	0.2285	-24 -55
7 Pisces	3.7	0.33	5.8	14 55.1	2 39.7	-12 6.8	-0.2338	0.5529	0.2140	-26 -52
101 Pisces	6.2	0.27	5.7	14 14.4	12 35.9	-10 58.3	-0.5110	0.5512	0.2110	-90 +8
105 Pisces	6.1	-0.69	-7.2	-15 32.2	23 1 17.5	-2 55.9	-1.0120	0.5383	-0.2083	+3 -70

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

FEBRUARY.

THE STAR'S					AT CONJUNCTION IN R. A.							Limiting Parallels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$		<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i>					
3 Arietis	6.4	+0.72	+7.6	+17 0.0	25	3	21.7	- 0 0.7	-1.0244	0.5533	+0.2033	-17	-73
4 Arietis	5.8	0.73	7.4	16 32.7		4	4.4	+ 0 40.5	-0.4133	0.5534	0.2021	+19	-57
5 Arietis	5.1	0.78	7.8	17 24.9		8	8.5	+ 4 36.1	-0.5012	0.5540	0.1952	+14	-62
35 B. Arietis	6.4	0.81	7.9	17 51.4		10	57.6	+ 7 19.3	-0.4148	0.5543	0.1903	+19	-56
47 B. Arietis	6.5	0.83	7.9	17 38.2		12	45.4	+ 9 3.4	+0.1516	0.5546	0.1870	+50	-25
20 H <sup>1</sup> . Arietis	6.4	+0.84	+7.6	+16 50.3		13	28.5	+ 9 45.0	+1.1116	0.5547	+0.1857	+90	+31
15 Arietis	5.9	0.85	8.3	19 6.7		14	0.4	+10 15.8	-1.1411	0.5548	0.1847	-28	-71
6 Arietis	5.6	0.89	8.4	19 31.2		17	19.2	-10 32.4	-0.9646	0.5552	0.1786	-14	-70
26 Arietis	6.2	0.96	8.4	19 29.4		22	49.9	- 5 13.2	+0.0202	0.5560	0.1680	+42	-30
$\mu$ Arietis	5.7	1.03	8.5	19 39.7	26	3	59.2	- 0 14.8	+0.6825	0.5566	0.1577	+90	+ 6
47 Arietis	5.8	+1.13	+8.5	+20 20.3		10	51.5	+ 6 22.9	+1.0112	0.5575	+0.1433	+90	+29
$\epsilon$ Arietis ( <i>mean</i> )	4.6	1.14	8.8	21 0.7		11	21.2	+ 6 51.6	+0.3766	0.5575	0.1423	+65	- 8
66 Arietis	6.1	1.33	8.8	22 31.3	27	0	5.2	+ 4 51.4	+0.4246	0.5586	0.1143	+69	- 3
7 Tauri	5.9	1.38	9.3	24 11.4		2	40.6	- 2 21.5	-1.0547	0.5588	0.1085	-23	-66
16 Tauri	5.4	1.45	9.1	24 1.9		7	11.0	+ 1 59.3	-0.4237	0.5590	0.0981	+18	-47
17 Tauri	3.8	+1.45	+9.0	+23 51.3		7	13.0	+ 2 1.2	-0.2333	0.5590	+0.0981	+28	-36
18 Tauri	5.6	1.45	9.2	24 34.9		7	19.9	+ 2 7.9	-0.9947	0.5590	0.0978	-19	-65
$\eta$ Tauri	4.3	1.45	9.1	24 12.6		7	21.4	+ 2 9.3	-0.5968	0.5590	0.0977	+ 8	-59
20 Tauri	4.1	1.45	9.1	24 6.7		7	37.6	+ 2 25.0	-0.4657	0.5590	0.0971	+15	-50
21 Tauri	5.8	1.46	9.1	24 17.9		7	39.6	+ 2 26.9	-0.6614	0.5590	0.0970	+ 4	-63
22 Tauri	6.5	+1.46	+9.1	+24 16.3		7	43.3	+ 2 30.5	-0.6274	0.5590	+0.0969	+ 6	-61
23 Tauri	4.3	1.46	8.9	23 41.6		7	51.0	+ 2 37.9	+0.0012	0.5590	0.0966	+41	-23
$\eta$ Tauri	3.0	1.46	8.9	23 51.1		8	21.1	+ 3 6.9	-0.1195	0.5590	0.0954	+35	-30
104 B. Tauri	5.5	1.46	8.7	23 10.2		8	44.1	+ 3 29.0	+0.6431	0.5591	0.0945	+90	+11
27 Tauri	3.7	1.47	8.9	23 48.2		9	4.9	+ 3 49.2	+0.0014	0.5591	0.0937	+42	-23
28 Tauri	5.2	+1.47	+8.9	+23 53.2		9	5.4	+ 3 49.6	-0.0866	0.5591	+0.0937	+36	-28
33 Tauri	6.0	1.52	8.4	22 56.3		12	31.8	+ 7 8.7	+1.2339	0.5591	0.0857	+84	+55
36 Tauri	5.6	1.58	8.5	23 52.8		15	41.3	+10 11.5	+0.4879	0.5591	0.0783	+74	+ 4
$\chi$ Tauri	5.3	1.72	8.5	25 26.2		23	35.3	- 6 11.4	-0.6347	0.5587	0.0595	+ 5	-58
62 Tauri	6.1	1.71	8.0	24 6.6	28	0	13.5	- 5 34.6	+0.8266	0.5587	0.0580	+90	+25
315 B. Tauri	6.3	+1.93	+6.9	+24 27.7		14	18.5	+ 8 0.6	+1.0343	0.5570	+0.0243	+90	+42
$k$ Tauri	5.6	+1.95	+7.0	+24 55.5		15	7.8	+ 8 48.1	+0.5532	0.5568	+0.0224	+81	+13

MARCH.

118 Tauri	5.4	+2.15	+5.7	+25 5.2	1	4	50.7	- 1 57.8	+0.4652	0.5539	-0.0101	+73	+ 9
125 Tauri	5.1	2.22	5.4	25 51.2		9	29.0	+ 2 30.9	-0.4434	0.5526	0.0209	+16	-42
132 Tauri	5.0	2.26	4.5	24 32.5		13	39.2	+ 6 32.3	+0.8818	0.5513	0.0305	+90	+31
412 B. Tauri	5.8	2.30	4.0	24 14.4		17	12.9	+ 9 58.7	+1.0909	0.5502	0.0386	+90	+45
139 Tauri	4.7	2.34	4.5	25 56.8		17	39.7	+10 24.6	-0.7947	0.5500	0.0396	- 5	-64
5 Geminorum	5.9	+2.39	+3.2	+24 26.4		23	48.7	- 7 39.0	+0.5693	0.5478	-0.0533	+82	+10
8 Geminorum	6.1	2.41	2.8	23 59.9	2	1	59.6	+ 5 32.6	+0.9333	0.5470	0.0581	+90	+32
9 Geminorum	6.2	2.41	2.7	23 46.2		2	17.9	- 5 14.9	+1.1658	0.5469	0.0588	+90	+50
52 B. Geminorum	6.5	2.54	1.7	24 39.7		11	41.0	+ 3 49.3	-0.4590	0.5432	0.0788	+16	-48
87 B. Geminorum	5.8	2.59	+0.5	23 42.1		18	28.2	+10 23.0	+0.0169	0.5402	0.0927	+42	-23
$\omega$ Geminorum	5.2	+2.65	0.0	+24 20.1		23	21.0	- 8 53.8	-1.1599	0.5380	-0.1024	-34	-66
44 Geminorum	5.9	2.64	-0.6	22 45.8	3	0	44.7	- 7 32.8	+0.4325	0.5374	0.1051	+70	- 2
$\delta$ Geminorum	3.5	2.69	1.8	22 8.1		7	48.7	+ 0 42.4	+0.3361	0.5343	0.1184	+62	- 9
58 Geminorum	6.0	2.72	1.8	23 6.3		9	24.1	+ 0 49.9	-0.9278	0.5334	0.1213	-13	-67
149 B. Geminorum	6.4	2.71	2.4	21 42.1		11	3.6	+ 2 26.2	+0.4221	0.5326	0.1244	+68	- 5
63 Geminorum	5.3	+2.72	-2.4	+21 36.9		11	29.1	+ 2 50.9	+0.4649	0.5324	-0.1251	-72	- 2

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

## MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
		s	"	s	d h m	h m				"	"
79 Geminorum	6.3	+2.76	-3.9	+20 30.9	3 19 58.2	+11 4.0	+0.5598	0.5284	-0.1398	+80	+1
SATURN	0.1	...	...	21 34.5	21 49.4	-11 8.3	-0.8772	0.5295	0.1434	-9	-68
209 B. Geminorum	6.2	2.77	4.6	19 32.2	23 19.7	-9 40.9	+1.1656	0.5270	0.1454	+90	+40
85 Geminorum	5.2	2.80	4.7	20 6.2	4 1 9.3	-7 54.7	+0.2702	0.5261	0.1484	+57	-15
217 B. Geminorum	6.3	2.81	5.1	20 2.6	3 42.2	-5 26.5	-0.0471	0.5249	0.1524	+39	-32
10 H. Cancri	6.1	+2.81	-5.6	+19 4.6	5 41.4	-3 31.0	+0.7206	0.5240	-0.1555	+90	+7
d <sup>1</sup> Cancri	5.9	2.86	6.9	18 35.9	15 4.1	+5 34.6	-0.2728	0.5198	0.1694	+26	-47
NEPTUNE	7.7	...	...	19 23.6	15 9.8	+5 40.2	-1.1727	0.5207	0.1698	-31	-71
d <sup>2</sup> Cancri	6.2	2.84	7.4	17 19.1	16 20.9	+6 49.1	+0.9298	0.5193	0.1712	+90	+18
9 Cancri	5.5	2.88	7.5	18 22.4	19 16.1	+9 39.1	-0.7475	0.5180	0.1752	0	-72
54 Cancri	6.3	+2.88	-9.3	+15 39.4	5 5 19.8	-4 35.1	+0.4417	0.5139	-0.1880	+69	-11
o <sup>1</sup> Cancri	5.1	2.90	9.7	15 38.3	8 34.1	-1 26.6	-0.1537	0.5127	0.1919	+33	-43
o <sup>2</sup> Cancri	5.7	2.90	9.7	15 53.9	8 44.5	-1 16.5	-0.4747	0.5126	0.1921	+16	-62
$\xi$ Leonis	5.1	2.90	12.5	11 39.9	6 3 0.1	-7 32.3	+0.5406	0.5066	0.2108	+76	-10
o Leonis	3.8	2.90	13.1	10 16.0	7 58.0	-2 42.9	+1.0334	0.5053	0.2151	+90	+19
83 B. Leonis	5.9	+2.90	-14.0	+9 19.4	16 14.6	+5 19.8	+0.2721	0.5034	-0.2214	+57	-25
89 B. Leonis	6.2	2.90	14.1	8 42.4	17 10.0	+6 13.6	+0.7506	0.5032	0.2220	+90	+1
$\pi$ Leonis	4.9	2.90	14.3	8 26.3	18 18.3	+7 20.0	+0.7938	0.5030	0.2228	+90	+3
43 Leonis	6.3	2.90	15.5	6 57.6	7 6 46.5	-4 32.6	-0.3962	0.5011	0.2301	+21	-62
155 B. Leonis	6.5	2.89	15.6	6 6.7	6 55.3	-4 24.1	+0.5088	0.5011	0.2302	+73	-14
35 Sextantis	6.1	+2.90	-16.4	+5 10.7	17 57.9	+6 20.2	-1.0301	0.5003	-0.2348	-16	-85
p <sup>4</sup> Leonis	5.7	2.88	17.3	2 24.1	8 6 57.6	-5 1.5	-1.0405	0.5006	0.2380	-16	-88
p <sup>5</sup> Leonis	5.3	2.86	17.5	0 22.6	10 43.0	-1 22.3	+0.2921	0.5009	0.2384	+58	-26
359 B. Leonis	6.3	2.86	17.7	+0 35.0	15 56.8	+3 42.8	-1.1810	0.5015	0.2387	-27	-89
388 B. Leonis	6.3	2.86	17.8	-1 14.9	18 28.0	+6 9.8	+0.2283	0.5019	0.2387	+54	-29
$\epsilon$ Leonis	5.1	+2.85	-17.8	-2 33.0	19 47.3	+7 26.9	+1.3418	0.5021	-0.2386	+84	+44
431 B. Leonis	6.2	2.85	18.0	1 58.9	9 0 12.0	+11 44.2	-0.3338	0.5029	0.2383	+24	-60
13 B. Virginis	5.9	2.83	18.0	4 52.6	7 3.6	-5 35.6	+1.2047	0.5044	0.2371	+85	+29
78 B. Virginis	6.5	2.82	18.2	5 15.8	19 31.9	+6 31.4	-1.3092	0.5081	0.2332	-42	-88
q Virginis	5.3	2.80	17.8	9 0.0	10 5 50.6	-7 27.5	+0.3812	0.5120	0.2280	+61	-21
370 B. Virginis	6.0	+2.78	-17.4	-11 12.2	16 30.0	+2 53.1	+0.3798	0.5168	-0.2207	+60	-21
75 Virginis	5.6	2.74	16.2	14 56.4	11 53.0	-2 19.3	+0.3020	0.5274	0.2024	+52	-25
83 Virginis	5.6	2.73	15.8	15 46.0	17 34.0	+3 11.1	+0.0583	0.5309	0.1956	+38	-38
85 Virginis	6.1	2.72	15.9	15 21.3	18 6.0	+3 42.1	-0.4875	0.5312	0.1950	+9	-72
43 H. Virginis	5.5	2.68	14.5	17 49.1	12 8 17.6	-6 33.7	-0.4788	0.5405	0.1752	+7	-72
231 G. Virginis	6.4	+2.68	-14.4	-18 12.2	9 3.9	-5 48.9	-0.2012	0.5410	-0.1741	+21	-53
236 G. Virginis	5.7	2.68	14.3	18 20.1	9 48.0	-5 6.3	-0.1882	0.5415	0.1729	+22	-52
9 G. Libræ	6.5	2.65	13.2	20 4.8	17 15.8	+2 6.6	+0.4241	0.5467	0.1608	+54	-18
17 G. Libræ	6.4	2.63	12.7	20 49.7	22 24.4	+7 4.8	+0.4158	0.5503	0.1517	+52	-18
18 G. Libræ	6.1	2.63	12.6	20 58.9	22 52.4	+7 31.9	+0.5070	0.5506	0.1509	+58	-13
43 B. Libræ	5.7	+2.61	-12.6	-21 2.8	13 3 24.8	+11 54.9	-0.0902	0.5538	-0.1424	+23	-46
47 G. Libræ	6.1	2.58	11.7	21 42.8	7 25.8	-8 12.5	+0.0597	0.5566	0.1346	+30	-38
64 G. Libræ	5.8	2.55	11.2	22 5.8	11 46.9	-4 0.6	-0.1019	0.5595	0.1258	+21	-47
153 B. Libræ	6.3	2.53	9.8	24 12.7	19 0.0	+2 57.0	+1.2737	0.5643	0.1104	+66	+52
169 B. Libræ	6.0	2.49	10.1	22 52.2	21 0.3	+4 52.9	-0.3552	0.5656	0.1059	+6	-63
177 B. Libræ	6.2	+2.49	-10.0	-22 52.9	21 40.1	+5 31.4	-0.4116	0.5660	-0.1044	+2	-68
42 Libræ	5.0	2.49	9.7	23 33.1	22 3.2	+5 53.6	+0.2526	0.5663	0.1036	+38	-27
31 B. Scorpii	5.4	2.45	8.9	24 17.4	13 47.8	+11 25.5	+0.4688	0.5698	0.0903	+49	-15
32 B. Scorpii	5.3	2.44	9.1	23 44.0	3 49.1	+11 26.8	-0.1154	0.5699	0.0902	+17	-48
3 Scorpii	5.9	2.46	8.6	25 0.1	4 6.4	+11 43.5	+1.1872	0.5700	0.0896	+65	+38
40 B. Scorpii	5.4	+2.44	-8.6	-24 35.7	5 45.3	-10 41.3	+0.6166	0.5710	-0.0857	+59	-6



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.		Hour Angle, $H$	$Y'$	$x'$	$y'$	N.	S.
		$\Delta\alpha$	$\Delta\delta$									
		s	"	"	d	h	m				"	"
50 B. Scorpii	6.4	+2.42	-8.4	-24 30.0	14	7	58.9	-8 32.7	+0.3325	0.5723	-0.0803	+40 -23
57 B. Scorpii	5.7	2.39	8.6	23 23.0		8	54.6	-7 39.0	-0.9104	0.5729	0.0780	-29 -90
24 G. Scorpii	6.2	2.40	8.3	24 14.6		9	37.7	-6 57.5	-0.0659	0.5732	0.0763	+18 -45
27 G. Scorpii	5.8	2.38	8.5	23 28.0		9	59.9	-6 36.2	-0.9057	0.5735	0.0754	-28 -90
41 G. Scorpii	6.3	2.38	8.0	24 12.8		12	4.1	-4 36.6	-0.2761	0.5746	0.0703	+7 -58
85 B. Scorpii	6.0	+2.39	-7.6	-25 16.1		12	31.2	-4 10.5	+0.7956	0.5749	-0.0691	+65 +5
19 Scorpii	4.9	2.34	7.8	23 58.3		14	54.2	-1 53.0	-0.7160	0.5761	0.0632	-18 -90
$\sigma$ Scorpii	3.1	2.36	7.3	25 23.8		15	6.6	-1 41.0	+0.7571	0.5762	0.0627	+65 +3
22 Scorpii	4.8	2.32	7.0	24 56.1		18	48.5	+1 52.5	+0.0611	0.5781	0.0532	+22 -38
126 B. Scorpii	6.1	2.26	6.7	24 18.6		23	27.1	+6 20.5	-0.8078	0.5803	0.0411	-26 -90
88 B. Ophiuchi	6.3	+2.19	-5.6	-24 58.1	15	6	50.1	-10 33.6	-0.3534	0.5832	-0.0214	-2 -64
26 Ophiuchi	5.8	2.18	5.7	24 51.9		6	54.7	-10 29.2	-0.4625	0.5833	0.0212	-8 -72
118 B. Ophiuchi	6.2	2.18	4.8	26 24.2		9	35.0	-7 55.1	+1.0820	0.5842	0.0139	+64 +28
137 B. Ophiuchi	6.3	2.14	5.0	25 9.3		11	44.2	-5 51.0	-0.2324	0.5849	0.0081	+3 -55
36 Oph. (1st star)	5.4	2.14	4.6	26 29.0		12	58.6	-4 39.6	+1.1315	0.5852	0.0047	+64 +33
39 Ophiuchi	5.1	+2.09	-5.1	-24 11.9		14	3.2	-3 37.4	-1.2300	0.5856	-0.0017	-61 -83
$\theta$ Ophiuchi	3.4	2.08	4.6	24 55.1		15	37.8	-2 6.4	-0.4858	0.5860	+0.0026	-11 -74
191 B. Ophiuchi	6.3	2.06	4.8	24 10.2		16	52.1	-0 55.1	-1.2521	0.5863	0.0061	-63 -77
136 G. Ophiuchi	6.3	2.08	4.1	25 52.3		17	33.9	-0 14.9	+0.5066	0.5865	0.0080	+45 -12
151 G. Ophiuchi	6.0	2.06	3.7	26 12.5		19	28.1	+1 34.8	+0.8721	0.5869	0.0132	+64 +11
63 Ophiuchi	6.1	+1.92	-3.2	-24 52.4	16	4	38.2	+10 23.2	-0.2622	0.5884	+0.0388	+4 -57
4 Sagittarii	4.8	1.88	3.3	23 48.6		6	34.8	-11 44.9	-1.2687	0.5885	0.0442	-64 -73
7 Sagittarii	5.5	1.88	3.0	24 17.0		7	46.6	-10 35.9	-0.7293	0.5886	0.0475	-20 -90
9 Sagittarii	6.0	1.87	3.0	24 21.9		8	10.7	-10 12.8	-0.6271	0.5887	0.0486	-14 -89
1 Sagittarii	5.2	1.82	2.8	23 43.2		11	16.7	-7 14.1	-1.1204	0.5888	0.0572	-46 -90
67 B. Sagittarii	6.4	+1.82	-1.9	-25 38.2		13	59.6	-4 37.7	+1.0026	0.5888	+0.0647	+64 +20
70 B. Sagittarii	6.4	1.79	2.0	24 57.2		15	7.1	-3 32.8	+0.3799	0.5887	0.0678	+42 -20
$\lambda$ Sagittarii	2.9	1.76	1.5	25 28.2		17	39.2	-1 6.9	+1.0845	0.5887	0.0747	+65 +27
24 Sagittarii	5.7	1.72	1.7	24 5.7		20	0.3	+1 8.7	-0.1306	0.5885	0.0811	+15 -49
117 B. Sagittarii	5.8	1.69	1.7	23 34.6		21	50.1	+2 54.2	-0.5048	0.5883	0.0861	-4 -74
26 Sagittarii	6.1	+1.67	-1.5	-23 54.7		23	9.0	+4 10.0	-0.0487	0.5882	+0.0896	+20 -44
126 B. Sagittarii	5.7	1.67	0.9	25 5.7	17	0	18.3	+5 16.5	+1.2583	0.5881	0.0927	+65 +50
$\nu^1$ Sagittarii	5.0	1.60	1.3	22 50.9		4	2.0	+8 51.5	-0.6579	0.5876	0.1026	-11 -90
$\nu^2$ Sagittarii	5.1	1.59	1.3	22 46.6		4	24.3	+9 12.9	-0.6924	0.5874	0.1036	-13 -90
154 B. Sagittarii	5.9	1.59	1.1	23 16.8		4	45.3	+9 33.1	-0.1447	0.5874	0.1045	+16 -50
168 B. Sagittarii	6.3	+1.56	-1.0	-22 48.8		6	59.3	+11 41.7	-0.3778	0.5870	+0.1103	+5 -65
$\sigma$ Sagittarii	3.9	1.53	1.2	21 51.9		8	12.7	-11 7.7	-1.2010	0.5868	0.1135	-49 -90
191 B. Sagittarii	6.5	1.53	0.6	23 19.3		9	48.3	-9 35.9	+0.4580	0.5864	0.1176	+51 -16
199 B. Sagittarii	6.4	1.49	1.0	21 47.8		11	18.4	-8 9.1	-0.9036	0.5861	0.1214	-24 -90
222 B. Sagittarii	5.5	1.46	0.4	22 33.5		14	33.2	-5 2.1	+0.2723	0.5852	0.1296	+41 -26
50 Sagittarii	5.5	+1.42	-0.4	-21 56.5		16	49.9	-2 50.7	-0.0474	0.5847	+0.1352	+24 -44
253 B. Sagittarii	6.1	1.40	0.4	21 29.2		18	40.5	-1 4.4	-0.2537	0.5841	0.1397	+14 -56
$f$ Sagittarii	5.1	1.30	0.3	19 57.7		0	55.2	+4 55.8	-0.8666	0.5822	0.1545	-18 -90
57 Sagittarii	6.0	1.27	-0.3	19 15.4		3	17.1	+7 12.1	-1.2019	0.5814	0.1599	-44 -90
$\sigma$ Capricorni	5.5	1.14	+0.7	19 22.7		14	22.4	-6 7.9	+0.8277	0.5774	0.1836	+71 +5
$\pi$ Capricorni	5.2	+1.10	+0.7	-18 29.1		17	39.0	-2 58.8	+0.5462	0.5761	+0.1902	+63 -12
$\rho$ Capricorni	5.0	1.09	0.6	18 5.3		18	17.5	-2 21.7	+0.2735	0.5758	0.1914	+47 -26
$\sigma$ Capricorni	5.6	1.09	0.9	18 51.5		18	42.6	-1 57.6	+1.1221	0.5757	0.1922	+71 +26
47 B. Capricorni	6.2	1.05	0.5	16 48.7		21	4.0	+0 18.5	-0.4621	0.5748	0.1967	+9 -70
61 B. Capricorni	5.9	1.02	0.6	16 25.2		23	9.4	+2 19.3	-0.4372	0.5739	0.2005	+10 -69
94 B. Capricorni	5.7	+0.95	+1.0	-16 21.1	19	6	19.3	+9 13.1	+0.9756	0.5711	+0.2129	+74 +14

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.							Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	z'	y'	N.	S.		
		Δα	Δδ										
		s	"	"	d	h	m	h	m				
95 B. Capricorni	5.9	+0.93	+0.7	-14 48.2	19	6	46.3	+ 9 39.1	-0.4675	0.5709	+0.2136	+10 -70	
53 B. Aquarii	6.5	0.86	0.9	13 32.8	14	5.9	- 7 17.5	-0.1094	0.5681	0.2249	+31 -47		
18 Aquarii	5.5	0.82	1.1	13 14.1	17	35.5	- 3 55.5	+0.3752	0.5668	0.2297	+58 -21		
72 B. Aquarii	6.5	0.80	0.9	11 55.7	19	20.0	- 2 14.7	-0.5188	0.5661	0.2320	+10 -74		
137 B. Capricorni	6.2	0.75	1.0	10 57.0	20	0 10.3	+ 2 25.1	-0.3506	0.5644	0.2380	+20 -62		
c <sup>1</sup> Capricorni	5.3	+0.72	+0.8	- 9 27.8	2	34.4	+ 4 44.0	-1.2485	0.5636	+0.2408	-37 -90		
c <sup>2</sup> Capricorni	6.3	0.72	0.9	9 39.6	3	7.2	+ 5 15.6	-0.9231	0.5634	0.2413	-12 -90		
λ Aquarii	5.5	0.74	1.3	11 44.9	3	13.0	+ 5 21.2	+1.1705	0.5634	0.2414	+78 +28		
96 B. Aquarii	6.5	0.71	1.3	-10 42.2	6	17.3	+ 8 18.9	+0.8805	0.5624	0.2447	+79 + 7		
NEW MOON.													
z Arietis	5.1	+0.56	+5.8	+17 24.9	24	18 12.9	- 7 31.3	-0.6769	0.5621	+0.1962	+ 4 -72		
35 B. Arietis	6.4	0.58	6.0	17 51.4	20	58.2	- 4 52.0	-0.5961	0.5626	0.1913	+ 9 -67		
47 B. Arietis	6.5	0.59	6.0	17 38.2	22	43.5	- 3 10.4	-0.0380	0.5630	0.1880	+39 -35		
20 H <sup>1</sup> Arietis	6.4	0.60	5.8	16 50.2	23	25.5	- 2 29.9	+0.9113	0.5632	0.1868	+90 +17		
15 Arietis	5.9	+0.60	+6.2	+19 6.7	23	56.7	- 1 59.8	-1.3202	0.5632	+0.1858	-53 -70		
θ Arietis	5.6	0.62	6.4	19 31.2	25	3 10.8	+ 1 7.3	-1.1504	0.5639	0.1796	-29 -70		
26 Arietis	6.2	0.66	6.4	19 29.4	8	33.3	+ 6 18.2	-0.1842	0.5648	0.1690	+31 -40		
μ Arietis	5.7	0.72	6.5	19 39.6	13	34.8	+11 8.7	+0.4634	0.5656	0.1587	+71 - 5		
47 Arietis	5.8	0.79	6.7	20 20.3	20	16.5	- 6 24.0	+0.7790	0.5666	0.1443	+90 +14		
ε Arietis (mean)	4.6	+0.79	+6.8	+21 0.7	20	45.4	- 5 56.2	+0.1509	0.5666	+0.1433	+50 -20		
66 Arietis	6.1	0.94	7.1	22 31.2	26	9 9.6	+ 6 0.9	+0.1834	0.5677	0.1150	+52 -15		
7 Tauri	5.9	0.97	7.5	24 11.3	11	40.9	+ 8 26.7	-1.2810	0.5678	0.1091	-54 -66		
16 Tauri	5.4	1.02	7.3	24 1.9	16	4.4	-11 19.5	-0.6619	0.5679	0.0987	+ 4 -63		
17 Tauri	3.8	1.02	7.3	23 51.3	16	6.3	-11 17.7	-0.4738	0.5679	0.0986	+15 -50		
18 Tauri	5.6	+1.03	+7.5	+24 34.9	16	13.0	-11 11.1	-1.2263	0.5679	+0.0984	-43 -65		
γ Tauri	4.3	1.03	7.4	24 12.6	16	14.5	-11 9.7	-0.8331	0.5679	0.0983	- 7 -66		
20 Tauri	4.1	1.03	7.3	24 6.7	16	30.3	-10 54.5	-0.7038	0.5679	0.0977	+ 1 -65		
21 Tauri	5.8	1.03	7.4	24 17.9	16	32.2	-10 52.7	-0.8972	0.5679	0.0976	-12 -66		
22 Tauri	6.5	1.03	7.4	24 16.3	16	35.8	-10 49.2	-0.8636	0.5679	0.0975	- 9 -66		
23 Tauri	4.3	+1.03	+7.2	+23 41.6	16	43.3	-10 42.0	-0.2426	0.5679	+0.0972	+27 -36		
η Tauri	3.0	1.04	7.2	23 51.1	17	12.6	-10 13.8	-0.3624	0.5679	0.0960	+21 -43		
104 B. Tauri	5.5	1.04	7.0	23 10.1	17	35.1	- 9 52.0	+0.3908	0.5679	0.0951	+66 - 3		
27 Tauri	3.7	1.05	7.2	23 48.2	17	55.3	- 9 32.6	-0.2435	0.5678	0.0943	+27 -36		
28 Tauri	5.2	1.05	7.2	23 53.2	17	55.9	- 9 32.1	-0.3305	0.5678	0.0943	+23 -41		
33 Tauri	6.0	+1.09	+6.8	+22 56.2	21	17.0	- 6 18.3	+0.9714	0.5678	+0.0862	+90 +32		
161 B. Tauri	6.5	1.11	6.8	22 58.2	22	55.7	- 4 43.1	+1.0768	0.5677	0.0822	+90 +40		
36 Tauri	5.6	1.13	7.0	23 52.8	27	0 21.8	- 3 20.2	+0.2316	0.5676	0.0787	+55 - 9		
χ Tauri	5.3	1.24	7.2	25 26.2	8	4.2	+ 4 5.4	-0.8838	0.5668	0.0597	-11 -65		
62 Tauri	6.1	1.24	6.7	24 6.6	8	41.5	+ 4 41.3	+0.5600	0.5667	0.0582	+81 +10		
95 Tauri	6.2	+1.36	+6.2	+23 56.1	16	53.2	-11 24.8	+1.1459	0.5654	+0.0380	+90 +50		
315 B. Tauri	6.3	1.44	6.0	24 27.7	22	27.4	- 6 2.7	+0.7580	0.5641	0.0242	+90 +24		
κ Tauri	5.6	1.45	6.1	24 55.5	23	15.6	- 5 16.3	+0.2818	0.5639	0.0223	+59 - 2		
103 Tauri	5.5	1.51	5.5	24 9.5	28	3 33.3	- 1 7.9	+1.1787	0.5627	+0.0118	-90 +55		
118 Tauri	5.4	1.64	5.1	25 5.1	12	42.3	+ 7 41.5	+0.1902	0.5597	-0.0103	+53 - 5		
125 Tauri	5.1	+1.72	+5.0	+25 51.2	17	15.7	-11 54.8	-0.7107	0.5580	-0.0211	0 -63		
132 Tauri	5.0	1.76	4.2	24 32.5	21	21.7	- 7 57.5	+0.6014	0.5564	0.0307	+86 +15		
412 B. Tauri	5.8	1.80	3.7	24 14.4	29	0 52.0	- 4 34.5	+0.8084	0.5549	0.0388	+90 +26		
139 Tauri	4.7	1.83	4.3	25 56.8	1	18.4	- 4 9.0	-1.0606	0.5547	0.0398	-26 -64		
5 Geminorum	5.9	1.89	3.1	24 26.4	7	22.2	+ 1 42.2	+0.2914	0.5519	0.0535	+59 - 4		
8 Geminorum	6.1	+1.91	+2.8	+23 59.9	9	31.3	+ 3 46.9	+0.6527	0.5509	-0.0583	+90 +15		

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MARCH.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>z'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$								
		<i>s</i>	<i>"</i>	<i>"</i>	<i>d h m</i>	<i>h m</i>				<i>s</i>	<i>"</i>
9 Geminorum	6.2	+1.92	+ 2.7	+23 46.2	29 9 49.4	+ 4 4.4	+0.8833	0.5508	-0.0589	+90	+28
36 B. Geminorum	6.0	1.96	2.1	23 22.5	13 41.9	+ 7 49.0	+1.0716	0.5489	0.0674	+90	+41
52 B. Geminorum	6.5	2.05	2.0	24 39.7	19 5.8	-10 58.2	-0.7277	0.5462	0 0788	- 1	-65
87 B. Geminorum	5.8	2.12	+ 0.9	23 42.1	30 1 48.8	- 4 28.7	-0.2538	0.5426	0.0926	+27	-37
44 Geminorum	5.9	2.18	- 0.1	22 45.8	8 2.1	+ 1 32.3	+0.1615	0.5393	0.1048	+51	-16
$\delta$ Geminorum	3.5	+2.25	- 1.1	+22 8.2	15 3.2	+ 8 19.7	+0.0689	0.5355	-0.1179	+45	-22
58 Geminorum	6.0	2.28	1.0	23 6.3	16 38.0	+ 9 51.4	-1.1873	0.5346	0.1208	-36	-67
149 B. Geminorum	6.4	2.27	1.7	21 42.1	18 17.0	+11 27.2	+0.1563	0.5338	0.1238	+50	-19
63 Geminorum	5.3	2.28	1.8	21 36.9	18 42.3	+11 51.7	+0.1992	0.5335	0.1245	+53	-16
79 Geminorum	6.3	2.35	3.1	20 30.9	31 3 9.1	- 3 57.5	+0.2994	0.5290	0.1390	+59	-13
SATURN	0.3	...	...	+21 40.6	4 11.1	- 2 57.4	-1.1265	0.5281	-0.1407	-29	-68
209 B. Geminorum	6.2	+2.37	- 3.9	19 32.2	6 29.9	- 0 43.0	+0.9053	0.5272	0.1444	+90	+20
85 Geminorum	5.2	2.40	3.9	20 6.2	8 19.2	+ 1 2.9	+0.0151	0.5262	0.1473	+42	-29
217 B. Geminorum	6.3	2.42	4.2	20 2.6	10 51.6	+ 3 30.6	-0.2987	0.5250	0.1513	+25	-46
10 H. Cancr	6.1	2.43	4.8	19 4.6	12 50.6	+ 5 25.9	+0.4679	0.5239	0.1543	+71	- 6
$\zeta$ Cancr ( <i>mean</i> )	4.7	+2.44	- 5.6	+17 53.9	16 35.0	+ 9 3.5	+1.1839	0.5221	-0.1599	+90	+40
$d^1$ Cancr	5.9	2.51	6.0	18 35.9	22 12.4	- 9 29.4	-0.5127	0.5193	0.1679	+13	-61
$d^2$ Cancr	6.2	+2.49	- 6.6	+17 19.1	23 29.1	- 8 15.0	+0.6876	0.5188	-0.1696	+90	+ 4

APRIL.

6 Cancr	5.5	+2.54	- 6.6	+18 22.4	1 2 24.1	- 5 25.3	-0.9814	0.5174	-0.1736	-16	-72
54 Cancr	6.3	2.58	8.5	15 39.4	12 27.9	+ 4 20.6	+0.2171	0.5130	0.1862	+53	-23
$\alpha^1$ Cancr	5.1	2.61	8.9	15 38.4	15 42.2	+ 7 29.2	-0.3725	0.5118	0.1899	+21	-56
$\alpha^2$ Cancr	5.7	2.61	8.8	15 53.9	15 52.6	+ 7 39.3	-0.6925	0.5117	0.1901	+ 3	-75
$\xi$ Leonis	5.1	+2.68	-12.0	+11 39.9	2 10 8.9	+ 1 24.1	+0.3497	0.5057	-0.2085	+61	-20
$\alpha$ Leonis	3.8	2.69	12.8	10 16.0	15 7.0	+ 6 13.7	+0.8505	0.5044	0.2127	+90	+ 7
83 B. Leonis	5.9	2.73	13.7	9 19.4	23 23.8	- 9 43.5	+0.1064	0.5027	0.2190	+47	-33
89 B. Leonis	6.2	2.74	14.0	8 42.4	3 0 19.2	- 8 49.5	+0.5860	0.5026	0.2197	+79	- 8
$\pi$ Leonis	4.9	2.74	14.1	8 26.3	1 27.5	- 7 43.2	+0.6313	0.5024	0.2205	+83	- 6
43 Leonis	6.3	+2.79	-15.5	+ 6 57.6	13 55.2	+ 4 23.8	-0.5304	0.5009	-0.2278	+13	-73
155 B. Leonis	6.5	2.78	15.7	6 6.7	14 4.0	+ 4 32.3	+0.3731	0.5009	0.2279	+63	-21
35 Sextantis	6.1	2.83	16.7	5 10.7	4 1 5.4	- 8 44.7	-1.1377	0.5007	0.2326	-24	-85
$p^4$ Leonis	5.7	2.86	17.9	2 24.1	14 2.2	+ 3 50.7	-1.1165	0.5016	0.2360	-22	-88
$p^5$ Leonis	5.3	2.88	18.4	0 22.6	17 46.5	+ 7 28.7	+0.2217	0.5021	0.2365	+53	-30
359 B. Leonis	6.3	+2.90	-18.6	+ 0 35.0	22 58.6	-11 27.9	-1.2340	0.5030	-0.2369	-32	-89
388 B. Leonis	6.3	2.90	19.0	+ 1 14.9	5 1 28.8	- 9 1.8	+0.1773	0.5036	0 2370	+51	-32
$e$ Leonis	5.1	2.90	19.2	2 33.0	2 47.6	- 7 45.1	+1.2906	0.5039	0 2370	+87	-38
431 B. Leonis	6.2	2.92	19.3	1 58.9	7 10.4	- 3 29.7	-0.3685	0.5049	0.2367	+22	-62
13 B. Virginis	5.9	2.94	19.8	4 52.6	13 58.6	+ 3 7.0	+1.1818	0.5068	0.2358	+85	+28
78 B. Virginis	6.5	+2.98	-20.0	- 5 15.8	6 2 19.8	- 8 53.0	-1.2904	0.5114	-0.2321	-40	-90
$q$ Virginis	5.3	3.02	20.2	9 0.0	12 31.5	+ 1 0.9	+0.4185	0.5158	0.2272	+64	-19
370 B. Virginis	6.0	3.06	20.0	11 12.3	23 2.7	+11 13.3	+0.4431	0.5213	0.2201	+64	-18
75 Virginis	5.6	3.12	19.2	14 56.5	7 18 9.3	+ 5 44.5	+0.4104	0.5327	0.2020	+59	-19
83 Virginis	5.6	3.14	18.8	15 46.0	23 45.3	+11 9.8	+0.1803	0.5363	0.1953	+44	-31
85 Virginis	6.1	+3.14	-18.8	-15 21.4	8 0 16.8	+11 40.3	-0.3615	0.5367	-0.1946	+15	-63
43 H. Virginis	5.5	3.17	17.5	17 49.1	14 15.8	+ 1 11.9	-0.3241	0.5462	0.1749	+15	-60
231 G. Virginis	6.4	3.18	17.4	18 12.3	15 1.4	+ 1 56.1	-0.0465	0.5467	0.1737	+29	-44
236 G. Virginis	5.7	3.18	17.4	18 20.2	15 44.9	+ 2 38.1	-0.0322	0.5472	0.1726	+30	-43
9 G. Libræ	6.5	3.20	16.4	20 4.8	23 6.4	+ 9 44.7	+0.5909	0.5523	0.1603	+65	- 8
17 G. Libræ	6.4	+3.21	-15.8	-20 49.7	9 4 10.7	- 9 21.5	+0.5918	0.5558	-0.1513	+64	- 8



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
18 G. Libræ	6.1	+3.21	-15.7	-20 58.9	9 4 38.4	-8 54.8	+0.6834	0.5561	-0.1504	+69	-3
43 B. Libræ	5.7	3.22	15.7	21 2.8	9 7.2	-4 35.4	+0.0965	0.5592	0.1419	+33	-36
47 G. Libræ	6.1	3.22	14.6	21 42.8	13 5.2	-0 45.8	+0.2522	0.5618	0.1340	+41	-27
64 G. Libræ	5.8	3.21	14.0	22 5.8	17 23.3	+3 23.2	+0.0978	0.5646	0.1251	+32	-35
169 B. Libræ	6.0	3.20	12.6	22 52.2	10 2 31.0	-11 49.0	-0.1416	0.5701	0.1051	+17	-49
177 B. Libræ	6.2	+3.19	-12.5	-22 53.0	3 10.4	-11 11.0	-0.1970	0.5705	-0.1037	+14	-53
42 Libræ	5.0	3.20	12.3	23 33.2	3 33.2	-10 49.0	+0.4658	0.5707	0.1028	+51	-15
31 B. Scorpïi	5.4	3.19	11.3	24 17.4	9 15.0	-5 19.9	+0.6892	0.5739	0.0894	+65	-2
32 B. Scorpïi	5.3	3.18	11.4	24 44.1	9 16.3	-5 18.6	+0.1063	0.5739	0.0894	+28	-35
40 B. Scorpïi	5.4	3.19	10.9	24 35.7	11 11.6	-3 27.7	+0.8391	0.5749	0.0848	+65	+8
50 B. Scorpïi	6.4	+3.18	-10.6	-24 30.1	13 24.3	-1 19.9	+0.5584	0.5760	-0.0794	+55	-9
57 B. Scorpïi	5.7	3.15	10.7	23 23.0	14 19.6	-0 26.6	-0.6813	0.5765	0.0771	-15	-90
24 G. Scorpïi	6.2	3.16	10.4	24 14.6	15 2.4	+0 14.6	+0.1626	0.5768	0.0754	+31	-32
27 G. Scorpïi	5.8	3.15	10.5	23 28.0	15 24.5	+0 35.8	-0.6754	0.5770	0.0745	-15	-90
41 G. Scorpïi	6.3	3.15	10.0	24 12.8	17 28.0	+2 34.7	-0.0446	0.5780	0.0694	+18	-44
85 B. Scorpïi	6.0	+3.17	-9.7	-25 16.2	17 55.0	+3 0.6	+1.0263	0.5782	-0.0682	+65	+22
19 Scorpïi	4.9	3.13	9.6	23 58.4	20 17.3	+5 17.5	-0.4810	0.5792	0.0622	-5	-73
6 Scorpïi	3.1	3.16	9.3	25 23.8	20 29.6	+5 29.4	+0.9909	0.5793	0.0617	+65	+19
22 Scorpïi	4.8	3.12	8.8	24 56.1	11 0 10.6	+9 1.9	+0.2994	0.5808	0.0522	+36	-24
126 B. Scorpïi	6.1	3.08	8.2	24 18.6	4 48.4	-10 30.9	-0.5649	0.5825	0.0401	-12	-81
88 B. Ophiuchi	6.3	+3.03	-6.8	-24 58.1	12 11.1	-3 25.3	-0.1043	0.5847	-0.0205	+11	-47
26 Ophiuchi	5.8	3.03	6.8	24 51.9	12 15.8	-3 20.8	-0.2135	0.5847	0.0203	+5	-54
137 B. Ophiuchi	6.3	3.00	5.9	25 9.3	17 5.7	+1 17.8	+0.0206	0.5857	0.0072	+16	-40
39 Ophiuchi	5.1	2.95	5.8	24 11.9	19 25.1	+3 31.8	-0.9776	0.5861	-0.0009	-39	-90
6 Ophiuchi	3.4	2.95	5.3	24 55.2	21 0.0	+5 2.9	-0.2307	0.5863	+0.0034	+3	-55
191 B. Ophiuchi	6.3	+2.92	-5.3	-24 10.2	22 14.6	+6 14.7	-0.9983	0.5865	+0.0068	-40	-90
6 Ophiuchi	4.3	2.92	5.3	24 6.1	22 45.0	+6 43.9	-1.0651	0.5865	0.0082	-45	-90
136 G. Ophiuchi	6.3	2.96	4.6	25 52.3	22 56.6	+6 55.1	-0.7656	0.5866	0.0087	+64	+4
51 Ophiuchi	4.8	2.89	5.0	23 54.0	12 0 45.8	+8 40.0	-1.2497	0.5867	0.0137	-63	-78
151 G. Ophiuchi	6.0	2.94	4.2	26 12.5	0 51.4	+8 45.4	+1.1336	0.5867	0.0140	+64	+33
63 Ophiuchi	6.1	+2.82	-3.1	-24 52.4	10 5.4	-6 22.2	+0.0005	0.5870	+0.0392	+18	-41
4 Sagittarii	4.8	2.77	3.1	23 48.6	12 3.0	-4 29.3	-1.0099	0.5870	0.0445	-39	-90
7 Sagittarii	5.5	2.77	2.7	24 17.0	13 15.6	-3 19.5	-0.4675	0.5869	0.0478	-6	-72
9 Sagittarii	6.0	2.76	2.6	24 21.8	13 39.9	-2 56.2	-0.3647	0.5869	0.0489	0	-64
1 Sagittarii	5.2	2.72	2.3	23 43.2	16 47.9	+0 4.5	-0.8597	0.5866	0.0573	-27	-90
67 B. Sagittarii	6.4	+2.72	-1.3	-25 38.2	19 32.8	+2 42.9	+1.2765	0.5862	+0.0647	+65	+59
70 B. Sagittarii	6.4	2.69	1.3	24 57.2	20 41.2	+3 48.6	+0.6504	0.5860	0.0678	+61	-4
24 Sagittarii	5.7	2.61	0.8	24 5.7	13 1 38.4	+8 34.2	+0.1380	0.5852	0.0808	+30	-33
117 B. Sagittarii	5.8	2.57	0.6	23 34.6	3 29.9	+10 21.4	-0.2385	0.5848	0.0857	+10	-55
26 Sagittarii	6.1	2.57	0.3	23 54.7	4 50.0	+11 38.4	+0.2211	0.5845	0.0891	+35	-28
28 Sagittarii	5.6	+2.51	-0.5	-22 28.8	6 39.3	-10 36.6	-1.0770	0.5840	+0.0938	-39	-90
30 Sagittarii	6.2	2.49	-0.3	22 15.5	8 28.1	-8 52.0	-1.1291	0.5835	0.0984	-43	-90
$\gamma^1$ Sagittarii	5.0	2.48	+0.1	22 50.9	9 47.9	-7 35.3	-0.3926	0.5832	0.1018	+4	-66
$\gamma^2$ Sagittarii	5.1	2.48	0.1	22 46.6	10 10.7	-7 13.3	-0.4274	0.5830	0.1028	+2	-69
154 B. Sagittarii	5.9	2.48	0.4	23 16.8	10 32.1	-6 52.8	+0.1248	0.5830	0.1036	+31	-34
168 B. Sagittarii	6.3	+2.44	+0.5	-22 48.8	12 48.5	-4 41.7	-0.1104	0.5823	+0.1093	+18	-47
o Sagittarii	3.9	2.41	0.4	21 51.8	14 3.3	-3 29.7	-0.9409	0.5819	0.1124	-27	-90
191 B. Sagittarii	6.5	2.41	1.1	23 19.3	15 40.8	-1 56.0	+0.7328	0.5814	0.1164	+67	+1
199 B. Sagittarii	6.4	2.36	0.8	21 47.8	17 12.8	-0 27.6	-0.6415	0.5808	0.1201	-8	-89
222 B. Sagittarii	5.5	2.33	1.6	22 33.4	20 31.6	+2 43.7	+0.5451	0.5796	0.1280	+58	-11
50 Sagittarii	5.5	+2.29	+1.7	-21 56.5	22 51.3	+4 58.1	+0.2218	0.5788	+0.1335	+39	-29

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	$Y'$	$x'$	$y'$	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m				'	"
253 B. Sagittarii	6.1	+2.26	+1.8	-21 29.1	14 0 44.4	+ 6 46.8	+0.0130	0.5781	+0.1378	+28	-40
f Sagittarii	5.1	2.14	2.1	19 57.7	7 8.0	-11 4.1	-0.6091	0.5755	0.1521	- 3	-84
57 Sagittarii	6.0	2.10	2.2	19 15.4	9 33.5	- 8 44.0	-0.9495	0.5745	0.1573	-23	-90
6 Capricorni	5.5	1.95	3.6	19 22.6	20 56.7	+ 2 13.8	+1.0978	0.5695	0.1802	+71	+25
$\pi$ Capricorni	5.2	1.89	3.7	18 29.0	15 0 18.9	+ 5 28.7	+0.8103	0.5680	0.1865	+72	+ 4
$\rho$ Capricorni	5.0	+1.88	+3.6	-18 5.3	0 58.6	+ 6 6.9	+0.5335	0.5677	+0.1877	+63	-12
47 B. Capricorni	6.2	1.82	3.5	16 48.6	3 50.0	+ 8 52.0	-0.2145	0.5664	0.1927	+22	-53
61 B. Capricorni	5.9	1.78	3.6	16 25.1	5 59.2	+10 56.6	-0.1913	0.5655	0.1964	+24	-52
94 B. Capricorni	5.7	1.69	4.3	16 21.0	13 22.3	- 5 56.3	+1.2334	0.5623	0.2083	+74	+36
95 B. Capricorni	5.9	1.66	3.8	14 48.2	13 50.1	- 5 29.4	-0.2307	0.5622	0.2090	+23	-54
53 B. Aquarii	6.5	+1.56	+4.1	-13 32.7	21 23.6	+ 1 47.9	+0.1228	0.5591	+0.2198	+43	-34
18 Aquarii	5.5	1.51	4.4	13 14.0	16 0 59.9	+ 5 16.6	+0.6094	0.5577	0.2244	+73	- 8
72 B. Aquarii	6.5	1.48	4.1	11 55.6	2 47.8	+ 7 0.7	-0.3006	0.5571	0.2266	+22	-58
137 B. Capricorni	6.2	1.41	4.2	10 57.0	7 47.4	+11 49.9	-0.1378	0.5553	0.2324	+30	-49
c <sup>1</sup> Capricorni	5.3	1.37	3.9	9 27.8	10 16.2	- 9 46.5	-1.0534	0.5546	0.2350	-21	-90
c <sup>2</sup> Capricorni	6.3	+1.37	+4.0	- 9 39.5	10 50.0	- 9 13.9	-0.7241	0.5544	+0.2356	0	-90
96 B. Aquarii	6.5	1.34	4.6	10 42.1	14 6.3	- 6 4.4	+1.1007	0.5534	0.2388	+79	+22
6 Aquarii	4.3	1.21	4.6	8 11.7	17 0 35.5	+ 4 3.3	+1.1326	0.5507	0.2473	+82	+24
44 Aquarii	5.7	1.19	3.9	5 48.1	0 44.2	+ 4 11.7	-1.2366	0.5506	0.2474	-34	-90
170 B. Aquarii	6.0	1.17	4.6	7 36.8	3 38.4	+ 7 0.0	+1.3042	0.5500	0.2492	+83	+41
51 Aquarii	5.8	+1.15	+4.0	- 5 15.4	3 54.9	+ 7 15.9	-0.9937	0.5500	+0.2494	-14	-90
$\kappa$ Aquarii	5.2	1.09	4.2	4 39.3	10 7.8	-10 43.8	-0.0363	0.5489	0.2527	+39	-43
207 B. Aquarii	6.3	1.07	4.2	3 59.1	11 31.1	- 9 23.3	-0.3580	0.5488	0.2533	+22	-62
6 G. Piscium	6.2	1.00	4.3	2 50.3	19 30.3	- 1 40.3	+0.5256	0.5479	0.2558	+74	-13
22 B. Piscium	6.4	0.89	4.3	0 9.8	18 7 5.6	+ 9 31.6	+0.8117	0.5477	0.2567	+90	+ 2
$\kappa$ Piscium	4.9	+0.88	+4.2	+ 0 48.1	8 39.2	+11 2.0	+0.2423	0.5477	+0.2565	+55	-29
9 Piscium	6.4	0.88	4.2	0 40.1	8 48.0	+11 10.5	+0.4147	0.5477	0.2565	+66	-20
16 Piscium	5.7	0.84	4.3	1 38.6	12 59.8	- 8 46.2	+0.5108	0.5480	0.2559	+72	-15
19 Piscium	5.4	0.81	4.2	3 1.6	17 34.5	- 4 20.7	+0.2877	0.5483	0.2546	+57	-26
NEW MOON.											
20 Tauri	4.1	+0.83	+5.6	+24 6.7	23 2 4.5	+ 0 27.7	-0.8795	0.5733	+0.0967	-11	-66
21 Tauri	5.8	0.83	5.7	24 17.9	2 6.4	+ 0 29.5	-1.0721	0.5733	0.0966	-26	-66
22 Tauri	6.5	0.83	5.7	24 16.3	2 9.9	+ 0 33.0	-1.0388	0.5734	0.0965	-23	-66
23 Tauri	4.3	0.83	5.6	23 41.5	2 17.4	+ 0 40.2	-0.4207	0.5734	0.0962	-17	-47
$\eta$ Tauri	3.0	+0.84	+5.6	+23 51.1	2 46.3	+ 1 8.0	-0.5409	0.5734	+0.0950	+10	-56
104 B. Tauri	5.5	0.84	5.5	23 10.1	3 8.5	+ 1 29.4	+0.2081	0.5734	0.0941	+53	-13
27 Tauri	3.7	0.84	5.6	23 48.1	3 28.4	+ 1 48.6	-0.4239	0.5734	0.0933	+17	-47
28 Tauri	5.2	0.84	5.6	23 53.1	3 29.0	+ 1 49.1	-0.5104	0.5734	0.0933	+12	-53
33 Tauri	6.0	0.87	5.4	22 56.2	6 47.4	+ 5 0.1	+0.7790	0.5735	0.0852	+90	+19
161 B. Tauri	6.5	+0.88	+5.3	+22 58.2	8 24.8	+ 6 34.0	+0.8809	0.5735	+0.0812	+90	+26
36 Tauri	5.6	0.90	5.4	23 52.8	9 49.6	+ 7 55.6	+0.0373	0.5735	0.0777	+43	-20
$\chi$ Tauri	5.3	0.97	5.5	25 26.2	17 25.4	- 8 45.4	-1.0847	0.5730	0.0588	-28	-65
62 Tauri	6.1	0.97	5.2	24 6.6	18 2.2	- 8 10.0	+0.3497	0.5729	0.0572	+63	- 2
95 Tauri	6.2	1.05	4.9	23 56.0	24 2 6.3	- 0 23.8	+0.9186	0.5717	0.0369	+90	+33
315 B. Tauri	6.3	+1.11	+4.7	+24 27.7	7 35.2	+ 4 52.9	+0.5250	0.5705	+0.0232	+77	+11
99 Tauri	6.0	1.11	4.6	23 49.3	8 14.9	+ 5 31.3	+1.2214	0.5703	0.0215	+85	+59
k Tauri	5.6	1.12	4.8	24 55.5	8 22.6	+ 5 38.7	+0.0507	0.5703	0.0212	+44	-14
103 Tauri	5.5	1.16	4.4	24 9.5	12 36.1	+ 9 42.9	+0.9355	0.5691	+0.0106	+90	+36
118 Tauri	5.4	1.26	4.1	25 5.1	21 36.3	- 5 36.6	-0.0583	0.5660	-0.0116	+38	-19
121 Tauri	5.1	+1.28	+3.6	+23 59.2	25 0 16.4	- 3 2.3	+1.0807	0.5649	-0.0180	+90	+46

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

APRIL.

THE STAR'S						AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.		Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>	
			$\Delta\alpha$	$\Delta\delta$									
			<i>s</i>	<i>"</i>	<i>°</i> <i>'</i>	<i>d</i> <i>h</i> <i>m</i>	<i>h</i> <i>m</i>						
125	Tauri	5.1	+1.32	+4.0	+25 51.2	25 2 5.2	-1 17.4	-0.9585	0.5642	-0.0224	-17	-64	
132	Tauri	5.0	1.35	3.4	24 32.5	6 7.4	+2 36.2	+0.3398	0.5624	0.0320	+62	0	
412 B.	Tauri	5.8	1.39	3.0	24 14.4	9 34.4	+5 55.8	+0.5415	0.5608	0.0401	+79	+10	
5	Geminorum	5.9	1.46	2.6	24 26.4	15 58.5	-11 53.7	+0.0214	0.5576	0.0548	+42	-19	
8	Geminorum	6.1	1.48	2.3	23 59.9	18 5.8	-9 50.9	+0.3781	0.5564	0.0596	+65	0	
9	Geminorum	6.2	+1.48	+2.2	+23 46.2	18 23.5	-9 33.7	+0.6068	0.5563	-0.0602	+86	+12	
36 B.	Geminorum	6.0	1.52	1.8	23 22.5	22 12.7	-5 52.5	+0.7904	0.5542	0.0687	+90	+21	
52 B.	Geminorum	6.5	1.60	1.7	24 39.7	26 332.0	+0 44.1	-1.0015	0.5511	0.0801	-20	-65	
87 B.	Geminorum	5.8	1.66	+0.8	23 42.1	10 9.8	+5 40.2	-0.5359	0.5472	0.0938	+11	-55	
44	Geminorum	5.9	1.72	0.0	22 45.8	16 18.5	+11 36.6	-0.1274	0.5434	0.1059	+34	-32	
120 B.	Geminorum	6.5	+1.73	-0.8	+21 23.6	18 34.6	-10 11.8	+1.1245	0.5420	-0.1102	+90	+40	
8	Geminorum	3.5	1.79	0.9	22 8.2	23 14.9	-5 40.8	-0.2232	0.5391	0.1189	+28	-38	
149 B.	Geminorum	6.4	1.81	1.3	21 42.1	27 226.8	-2 35.3	-0.1378	0.5372	0.1246	+33	-35	
61	Geminorum	5.8	1.80	1.8	20 25.4	2 30.0	-2 32.1	+1.2560	0.5371	0.1248	+84	+53	
63	Geminorum	5.3	1.82	1.4	21 36.9	2 51.8	-2 10.9	-0.0954	0.5369	0.1254	+36	-32	
79	Geminorum	6.3	+1.90	-2.6	+20 30.9	11 14.0	+5 55.1	+0.0014	0.5318	-0.1396	+41	-29	
209 B.	Geminorum	6.2	1.92	3.3	19 32.3	14 33.2	+9 8.0	+0.6038	-0.5298	0.1450	+83	+2	
85	Geminorum	5.2	1.95	3.2	20 6.2	16 21.7	+10 53.1	-0.2827	0.5286	0.1479	+25	-45	
217 B.	Geminorum	6.3	1.98	3.5	20 2.6	18 53.0	-10 40.3	-0.5955	0.5271	0.1517	+8	-65	
10 H.	Cancr	6.1	1.98	4.0	19 4.6	20 51.2	-8 45.8	+0.1675	0.5260	0.1547	+51	-22	
ζ	Cancr ( <i>mean</i> )	4.7	+2.00	-4.8	+17 53.9	28 034.3	-5 9.6	+0.8806	0.5238	-0.1602	+90	+16	
<i>d</i> <sup>1</sup>	Cancr	5.9	2.07	5.1	18 35.9	6 9.9	+0 15.8	-0.8093	0.5207	0.1680	-4	-71	
<i>d</i> <sup>2</sup>	Cancr	6.2	2.06	5.7	17 19.1	7 26.3	+1 29.8	-0.3868	0.5200	0.1697	+65	-12	
θ	Cancr	5.5	2.11	5.6	18 22.4	10 20.6	+4 18.9	-1.2761	0.5185	0.1735	+44	-72	
54	Cancr	6.3	2.16	7.5	15 39.4	20 22.6	-9 57.0	-0.0786	0.5135	0.1856	+37	-39	
o <sup>1</sup>	Cancr	5.1	+2.20	-7.8	+15 38.4	23 36.5	-6 48.8	-0.6655	0.5120	-0.1893	+5	-74	
o <sup>2</sup>	Cancr	5.7	2.20	7.7	15 53.9	23 46.9	-6 38.7	-0.9845	0.5119	0.1895	-15	-74	
ξ	Leonis	5.1	2.32	10.8	11 39.9	29 18 3.1	+11 6.1	+0.0675	0.5049	0.2072	+45	-34	
o	Leonis	3.8	2.34	11.7	10 16.0	23 1.6	-8 3.9	+0.5724	0.5034	0.2112	+78	-9	
83 B.	Leonis	5.9	2.41	12.6	9 19.4	30 7 19.5	0 0.0	-0.1620	0.5015	0.2172	+32	-48	
89 B.	Leonis	6.2	+2.41	-12.9	+8 42.4	8 14.9	+0 53.9	+0.3183	0.5012	-0.2178	+59	-23	
π	Leonis	4.9	2.42	13.1	8 26.4	9 23.5	+2 0.5	+0.3649	0.5011	0.2186	+62	-20	
43	Leonis	6.3	2.51	14.5	6 57.6	21 53.4	-9 50.3	-0.7795	0.4994	0.2256	-1	-83	
155 B.	Leonis	6.5	+2.50	-14.8	+6 6.7	22 2.2	-9 41.8	+0.1239	0.4994	-0.2257	+48	-34	

MAY.

35	Sextantis	6.1	+2.58	-15.7	+5 10.8	1 9 5.6	+13.4	-1.3690	0.4990	-0.2302	-51	-78
p <sup>3</sup>	Leonis	6.1	2.64	17.7	0 26.5	20 15.9	+1155.2	+1.2506	0.4999	0.2331	+90	+34
p <sup>4</sup>	Leonis	5.7	2.66	17.3	2 24.1	22 4.8	-1018.9	-1.3244	0.5001	0.2334	-43	-86
p <sup>5</sup>	Leonis	5.3	+2.69	-18.0	+0 22.6	3 149.7	-640.3	+0.0206	0.5007	-0.2340	+42	-40
358 B.	Leonis	6.3	2.74	18.8	-1 14.9	9 32.8	+050.0	-0.0081	0.5024	0.2344	+40	-41
e	Leonis	5.1	2.75	19.1	2 33.0	10 51.8	+26.8	+1.1072	0.5027	0.2344	+87	+22
431 B.	Leonis	6.2	2.79	19.1	1 58.9	15 14.9	+622.5	-0.5413	0.5039	0.2342	+12	-75
13 B.	Virginis	5.9	2.83	20.0	4 52.6	22 3.4	-110.5	+1.0224	0.5062	0.2333	+85	+16
64 B.	Virginis	6.5	+2.91	-20.6	-7 19.1	3 8 23.3	-058.2	+1.2732	0.5103	-0.2305	+83	+37
q	Virginis	5.3	3.02	20.9	9 0.0	20 33.8	+1051.0	+0.3126	0.5164	0.2251	+56	-24
370 B.	Virginis	6.0	3.10	21.1	11 12.3	4 7 2.0	-259.6	+0.3626	0.5226	0.2183	+58	-23
75	Virginis	5.6	3.27	20.6	14 56.5	5 159.4	-837.7	+0.3766	0.5354	0.2006	+56	-21
83	Virginis	5.6	3.32	20.4	15 46.1	7 31.8	-316.0	+0.1613	0.5395	0.1940	+42	-32
85	Virginis	6.1	+3.32	-20.3	-15 21.4	8 3.0	-245.8	-0.3763	0.5399	-0.1934	+14	-64

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limit- ing Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
		s	"	'	d h m	h m				'	"
43 H. Virginis	5.5	+3.44	-19.2	-17 49.2	5 21 51.3	+10 35.1	-0.3055	0.5505	-0.1739	+16	-59
231 G. Virginis	6.4	3.45	19.2	18 12.3	22 36.3	+11 18.6	-0.0279	0.5510	0.1727	+30	-42
236 G. Virginis	5.7	3.46	19.1	18 20.2	23 19.2	+12 0.0	-0.0120	0.5516	0.1716	+31	-42
9 G. Libræ	6.5	3.53	18.4	20 4.8	6 34.0	-5 0.0	+0.6237	0.5572	0.1594	+66	-5
17 G. Libræ	6.4	3.57	17.8	20 49.8	11 33.4	-0 11.1	+0.6357	0.5611	0.1504	+66	-5
18 G. Libræ	6.1	+3.57	-17.7	-20 58.9	12 0.7	+0 15.2	+0.7277	0.5614	-0.1495	+69	0
43 B. Libræ	5.7	3.62	17.7	21 2.8	16 25.0	+4 30.1	+0.1549	0.5648	0.1410	+36	-32
47 G. Libræ	6.1	3.63	16.5	21 42.8	20 18.8	+8 15.5	+0.3179	0.5676	0.1332	+44	-23
64 G. Libræ	5.8	3.65	15.8	22 5.8	7 0 32.3	-11 40.2	+0.1737	0.5707	0.1243	+35	-31
169 B. Libræ	6.0	3.69	14.3	22 52.3	9 29.7	-3 2.7	-0.0451	0.5767	0.1042	+22	-44
177 B. Libræ	6.2	+3.70	-14.2	-22 53.0	10 8.4	-2 25.4	-0.0987	0.5771	-0.1027	+19	-47
42 Libræ	5.0	3.71	14.0	23 33.2	10 30.8	-2 3.9	+0.5592	0.5774	0.1018	+56	-9
31 B. Scorpïi	5.4	3.74	13.0	24 17.4	16 5.9	+3 18.5	+0.7917	0.5808	0.0884	+66	+5
32 B. Scorpïi	5.3	3.73	13.0	23 44.1	16 7.2	+3 19.8	+0.2139	0.5808	0.0884	+34	-29
40 B. Scorpïi	5.4	3.75	12.6	24 35.8	18 0.3	+5 8.6	+0.9441	0.5818	0.0838	+65	+16
50 B. Scorpïi	6.4	+3.75	-12.2	-24 30.1	20 10.3	+7 13.6	+0.6698	0.5830	-0.0783	+62	-3
57 B. Scorpïi	5.7	3.72	12.1	23 23.0	21 4.6	+8 5.9	-0.5573	0.5835	0.0760	-8	-80
24 G. Scorpïi	6.2	3.74	11.9	24 14.6	21 46.6	+8 46.3	+0.2805	0.5838	0.0743	+36	-25
27 G. Scorpïi	5.8	3.73	11.9	23 28.1	22 8.2	+9 7.0	-0.5495	0.5840	0.0734	-8	-79
41 G. Scorpïi	6.3	3.74	11.4	24 12.8	8 0 9.2	+11 3.4	+0.0796	0.5850	0.0682	+25	-36
85 B. Scorpïi	6.0	+3.77	-11.2	-25 16.2	0 35.7	+11 28.9	+1.1419	0.5853	-0.0671	+65	+34
19 Scorpïi	4.9	3.74	10.9	23 58.4	2 55.2	-10 17.0	-0.3479	0.5863	0.0610	+2	-63
6 Scorpïi	3.1	3.78	10.7	25 23.9	3 7.3	-10 5.4	+1.1116	0.5864	0.0605	+65	+30
9 Ophiuchi	4.7	3.72	10.6	23 15.6	4 54.6	-8 22.3	-1.2011	0.5872	0.0558	-54	-89
22 Scorpïi	4.8	3.76	10.0	24 56.2	6 44.0	-6 37.1	+0.4326	0.5881	0.0510	+44	-16
126 B. Scorpïi	6.1	+3.73	-9.1	-24 18.6	11 16.4	-2 15.3	-0.4164	0.5897	-0.0388	-4	-68
88 B. Ophiuchi	6.3	3.73	7.4	24 58.1	18 30.5	+4 41.6	+0.0525	0.5917	0.0191	+19	-38
26 Ophiuchi	5.8	3.73	7.5	24 51.9	18 35.1	+4 46.1	-0.0556	0.5917	0.0188	+13	-44
137 B. Ophiuchi	6.3	3.72	6.4	25 9.3	23 19.6	+9 19.2	+0.1841	0.5927	-0.0056	+25	-30
6 Ophiuchi	3.4	3.70	5.6	24 55.2	9 3 9.6	-11 0.0	-0.0591	0.5932	+0.0051	+12	-44
191 B. Ophiuchi	6.3	+3.67	-5.4	-24 10.2	4 22.8	-9 49.7	-0.8188	0.5933	+0.0085	-29	-90
6 Ophiuchi	4.3	3.66	5.4	24 6.1	4 52.7	-9 21.0	-0.8843	0.5933	0.0099	-33	-90
136 G. Ophiuchi	6.3	3.71	5.0	25 52.3	5 4.1	-9 10.0	+0.9322	0.5934	0.0104	+64	+15
51 Ophiuchi	4.8	3.65	5.0	23 54.1	6 51.3	-7 27.1	-1.0646	0.5935	0.0155	-45	-90
63 Ophiuchi	6.1	3.61	2.7	24 52.3	16 1.5	+1 21.1	+0.1892	0.5933	0.0410	+29	-30
4 Sagittarii	4.8	+3.57	-2.5	-23 48.6	17 57.3	+3 12.4	-0.8116	0.5930	+0.0463	-26	-90
7 Sagittarii	5.5	3.57	2.2	24 17.0	19 8.7	+4 20.9	-0.2714	0.5929	0.0496	+5	-58
9 Sagittarii	6.0	3.57	2.1	24 21.8	19 32.6	+4 43.9	-0.1688	0.5928	0.0507	+10	-51
1 Sagittarii	5.2	3.53	1.5	23 43.2	22 37.8	+7 41.7	-0.6566	0.5923	0.0592	-15	-90
70 B. Sagittarii	6.4	3.53	-0.4	24 57.2	10 2 27.8	+11 22.6	+0.8489	0.5915	0.0696	+65	+9
24 Sagittarii	5.7	+3.46	+0.4	-24 5.7	7 21.1	-7 55.7	+0.3455	0.5902	+0.0826	+41	-21
117 B. Sagittarii	5.8	3.43	0.7	23 34.6	9 11.2	-6 9.9	-0.0267	0.5897	0.0874	+21	-42
26 Sagittarii	6.1	3.42	1.0	23 54.7	10 30.4	-4 53.9	+0.4319	0.5892	0.0909	+47	-16
28 Sagittarii	5.6	3.37	1.0	22 28.8	12 18.4	-3 10.1	-0.8575	0.5886	0.0956	-24	-90
30 Sagittarii	6.2	3.34	1.3	22 15.5	14 6.0	-1 26.7	-0.9076	0.5879	0.1002	-26	-90
7 <sup>1</sup> Sagittarii	5.0	+3.34	+1.8	-22 50.9	15 25.0	-0 10.8	-0.1733	0.5874	+0.1035	+14	-51
7 <sup>2</sup> Sagittarii	5.1	3.34	1.8	22 46.5	15 47.5	+0 10.8	-0.2076	0.5873	0.1045	+13	-53
154 B. Sagittarii	5.9	3.34	2.0	23 16.8	16 8.6	+0 31.2	+0.3425	0.5872	0.1053	+43	-22
168 B. Sagittarii	6.3	3.31	2.4	22 48.8	18 23.8	+2 41.0	+0.1107	0.5862	0.1110	+30	-35
o Sagittarii	3.9	3.27	2.3	21 51.8	19 37.8	+3 52.1	-0.7152	0.5857	0.1140	-13	-90
191 B. Sagittarii	6.5	+3.29	+3.1	-23 19.3	21 14.5	+5 25.1	+0.9533	0.5850	+0.1179	+67	+16

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, $H$	$Y$	$x'$	$y'$	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
$\pi$ Sagittarii	3.0	+3.23	+2.5	-21 9.4	10 21 41.0	+ 5 50.6	-1.1948	0.5848	+0.1190	-48	-90
199 B. Sagittarii	6.4	3.23	2.9	21 47.8	22 45.6	+ 6 52.6	-0.4143	0.5843	0.1216	+ 4	-67
222 B. Sagittarii	5.5	3.21	3.8	22 33.4	11 2 3.0	+10 2.4	+0.7713	0.5828	0.1295	+67	+ 3
50 Sagittarii	5.5	3.17	4.1	21 56.4	4 21.8	-11 44.1	+0.4511	0.5817	0.1348	+52	-16
253 B. Sagittarii	6.1	3.14	4.3	21 29.1	6 14.1	- 9 56.1	+0.2445	0.5807	0.1391	+40	-27
$f$ Sagittarii	5.1	+3.02	+5.0	-19 57.6	12 36.0	- 3 48.7	-0.3717	0.5775	+0.1531	+ 9	-64
57 Sagittarii	6.0	2.97	5.2	19 15.3	15 1.0	- 1 29.1	-0.7102	0.5761	0.1582	- 9	-90
$\pi$ Capricorni	5.2	2.76	7.3	18 29.0	12 5 46.4	-11 16.6	+1.0568	0.5679	0.1865	+72	+21
31 B. Capricorni	6.4	2.71	6.5	16 0.9	6 24.1	-10 40.2	-1.3244	0.5675	0.1876	-58	-76
$\rho$ Capricorni	5.0	2.74	7.2	18 5.2	6 26.1	-10 38.3	+0.7800	0.5675	0.1877	+72	+ 2
47 B. Capricorni	6.2	+2.68	+7.2	-16 48.6	9 18.2	- 7 52.5	+0.0319	0.5659	+0.1926	+35	-39
$\tau$ Capricorni	5.2	2.64	6.9	15 14.7	10 55.7	- 6 18.5	-1.2373	0.5650	0.1953	-43	-90
61 B. Capricorni	5.9	2.65	7.4	16 25.1	11 27.9	- 5 47.4	+0.0556	0.5648	0.1962	+37	-38
95 B. Capricorni	5.9	2.52	7.9	14 48.1	19 21.6	+ 1 49.4	+0.0169	0.5604	0.2082	+36	-40
53 B. Aquarii	6.5	2.40	8.4	13 32.7	13 2 59.1	+ 9 10.8	+0.3713	0.5565	0.2184	+57	-21
18 Aquarii	5.5	+2.34	+8.7	-13 14.0	6 37.8	-11 18.1	+0.8595	0.5547	+0.2228	+77	+ 6
72 B. Aquarii	6.5	2.30	8.4	11 55.6	8 26.9	- 9 32.8	-0.0555	0.5539	0.2249	+34	-44
137 B. Capricorni	6.2	2.23	8.6	10 56.9	13 30.3	- 4 39.8	+0.1063	0.5516	0.2302	+43	-35
$c^1$ Capricorni	5.3	2.18	8.3	9 27.7	16 1.2	- 2 14.1	-0.8163	0.5506	0.2327	- 7	-90
$c^2$ Capricorni	6.3	2.17	8.5	9 39.4	16 35.5	- 1 41.0	-0.4853	0.5503	0.2332	+13	-71
96 B. Aquarii	6.5	+2.14	+9.1	-10 42.0	19 54.8	+ 1 31.6	+1.3500	0.5490	+0.2362	+76	+50
$\theta$ Aquarii	4.3	1.98	9.2	8 11.7	14 6 34.6	+11 49.8	+1.3759	0.5454	0.2439	+74	+54
44 Aquarii	5.7	1.96	8.3	5 48.0	6 43.5	+11 58.4	-1.0131	0.5453	0.2440	-17	-90
51 Aquarii	5.8	1.91	8.4	5 15.3	9 57.8	- 8 53.8	-0.7714	0.5444	0.2458	- 1	-90
$\kappa$ Aquarii	5.2	1.84	8.6	4 39.2	16 18.2	- 2 46.0	+0.1878	0.5430	0.2487	+51	-31
207 B. Aquarii	6.3	+1.81	+8.5	- 3 59.0	17 43.3	- 1 23.7	-0.1385	0.5427	+0.2493	+33	-49
6 G. Piscium	6.2	1.71	8.6	2 50.3	15 1 52.9	+ 6 29.8	+0.7436	0.5414	0.2514	+87	- 1
22 B. Piscium	6.4	1.57	8.4	0 9.7	13 44.4	- 6 2.0	+1.0160	0.5407	0.2518	+90	+15
$\kappa$ Piscium	4.9	1.55	8.1	+ 0 48.2	15 20.3	- 4 29.3	+0.4378	0.5407	0.2516	+67	-18
9 Piscium	6.4	1.55	8.2	0 40.1	15 29.2	- 4 20.7	+0.6120	0.5407	0.2516	+81	- 9
16 Piscium	5.7	+1.50	+8.1	+ 1 38.6	19 47.2	- 0 11.2	+0.7021	0.5408	+0.2508	+90	- 3
19 Piscium	5.4	1.45	7.9	3 1.7	16 0 28.6	+ 4 21.0	+0.4683	0.5412	0.2495	+69	-16
36 Piscium	6.2	1.31	6.9	7 46.9	14 34.7	- 6 0.7	-0.8980	0.5433	0.2427	- 8	-82
$d$ Piscium	5.4	1.30	7.1	7 43.9	16 27.1	- 4 12.0	-0.3937	0.5437	0.2414	+20	-62
136 B. Piscium	6.5	1.22	7.0	8 54.3	17 1 59.4	+ 5 1.3	+0.6768	0.5461	0.2338	+88	- 3
75 Piscium	6.3	+1.14	+6.4	+12 30.8	13 35.3	- 7 46.2	-0.3719	0.5498	+0.2219	+21	-58
$\eta$ Piscium	3.7	1.08	6.1	14 55.2	18 0 50.1	+ 3 5.5	-0.4266	0.5538	0.2076	+18	-59
101 Piscium	6.2	1.07	6.3	14 14.4	2 45.8	+ 4 57.3	+0.6713	0.5546	0.2048	+89	+ 1
105 Piscium	6.1	1.06	6.0	15 59.2	4 29.6	+ 6 37.5	-0.7752	0.5553	0.2023	- 2	-74
3 Arietis	6.4	1.04	5.8	17 0.0	7 33.9	+ 9 35.4	-1.2048	0.5565	0.1977	-34	-73
4 Arietis	5.8	+1.04	+5.9	+16 32.7	8 16.6	+10 16.7	-0.5960	0.5567	+0.1966	+ 8	-68
$\epsilon$ Arietis	5.1	1.03	5.8	17 24.9	12 19.8	- 9 48.6	-0.7102	0.5583	+0.1901	+ 2	-73
NEW MOON.											
132 Tauri	5.0	+1.22	+2.5	+24 32.5	22 14 51.5	-10 51.8	+0.1996	0.5655	-0.0337	+53	- 7
412 B. Tauri	5.8	+1.24	+2.2	+24 14.4	18 17.4	- 7 33.3	+0.3957	0.5641	-0.0418	+66	+ 3
5 Geminorum	5.9	1.29	1.8	24 26.4	23 0 39.1	- 1 25.2	-0.1331	0.5610	0.0565	+33	-27
8 Geminorum	6.1	1.30	1.6	23 59.9	2 45.4	+ 0 36.7	+0.2199	0.5599	0.0612	+54	- 9
9 Geminorum	6.2	1.30	1.5	23 46.2	3 3.1	+ 0 53.8	+0.4477	0.5597	0.0619	+70	+ 3
36 B. Geminorum	6.0	1.32	1.2	23 22.5	6 50.6	+ 4 33.3	+0.6255	0.5577	0.0704	+88	+12
52 B. Geminorum	6.5	+1.38	+1.1	+24 39.7	12 7.6	+ 9 39.3	-1.1699	0.5547	-0.0818	-36	-65



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

MAY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.			
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.			Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$		d	h	m						
87 B. Geminorum	5.8	+1.42	+ 0.3	+23 42.1	23	18	42.3	- 7 59.5	-0.7138	0.5509	-0.0955	0	-66
44 Geminorum	5.9	1.46	- 0.3	22 45.8	24	0	48.2	- 2 5.9	-0.3138	0.5470	0.1076	+23	-42
120 B. Geminorum	6.5	1.46	0.9	21 23.6		3	3.2	+ 0 4.6	+0.9322	0.5457	0.1119	+90	+26
$\delta$ Geminorum	3.5	1.51	1.0	22 8.2		7	41.4	+ 4 33.6	-0.4175	0.5427	0.1206	+17	-50
56 Geminorum	5.2	1.50	1.5	20 36.1		8	34.2	+ 5 24.6	+1.1517	0.5421	0.1222	+90	+42
149 B. Geminorum	6.4	+1.52	- 1.4	+21 42.1		10	51.7	+ 7 37.6	-0.3358	0.5406	-0.1263	+22	-46
61 Geminorum	5.8	1.52	1.7	20 25.4		10	54.9	+ 7 40.7	+1.0545	0.5405	0.1264	+90	+33
63 Geminorum	5.3	1.53	1.5	21 36.9		11	16.6	+ 8 1.8	-0.2939	0.5403	0.1270	+24	-43
79 Geminorum	6.3	1.59	2.4	20 30.9		19	35.1	- 7 55.9	-0.2059	0.5349	0.1412	+29	-40
209 B. Geminorum	6.2	1.61	3.0	19 32.3		22	52.9	- 4 44.3	+0.3918	0.5328	0.1465	+65	- 9
85 Geminorum	5.2	+1.63	- 3.0	+20 6.2	25	0	40.6	- 3 0.2	-0.4942	0.5316	-0.1494	+14	-58
217 B. Geminorum	6.3	1.65	3.2	20 2.6		3	11.0	- 0 34.5	-0.8086	0.5300	0.1532	- 5	-70
10 H. Cancri	6.1	1.66	3.6	19 4.6		5	8.4	+ 1 19.2	-0.0490	0.5288	0.1561	+38	-33
$\zeta$ Cancri ( <i>mean</i> )	4.7	1.68	4.3	17 53.9		8	50.2	+ 4 54.2	+0.6596	0.5264	0.1615	+89	+ 4
$d^1$ Cancri	5.9	1.73	4.5	18 35.9		14	23.9	+10 17.7	-1.0312	0.5230	0.1692	-20	-71
$d^2$ Cancri	6.2	+1.72	- 5.0	+17 19.2		15	39.9	+11 31.3	+0.1619	0.5223	-0.1709	+50	-24
90 B. Cancri	6.3	1.75	6.0	15 36.0		20	53.6	- 7 24.5	+1.1462	0.5192	0.1775	+90	+34
54 Cancri	6.3	1.82	6.6	15 39.4	26	4	32.8	+ 0 1.0	-0.3105	0.5151	0.1865	+24	-51
$o^1$ Cancri	5.1	1.85	6.8	15 38.4		7	46.2	+ 3 8.7	-0.8981	0.5134	0.1900	- 9	-74
$o^2$ Cancri	5.7	1.85	6.8	15 53.9		7	56.6	+ 3 18.8	-1.2169	0.5133	0.1902	-35	-74
222 B. Cancri	6.3	+1.90	- 9.0	+11 50.8		18	39.8	-10 16.6	+1.1641	0.5082	-0.2008	+90	+32
$\xi$ Leonis	5.1	1.97	9.6	11 39.9	27	2	11.4	- 2 57.9	-0.1710	0.5052	0.2072	+32	-47
$o$ Leonis	3.8	2.00	10.4	10 16.1		7	10.2	+ 1 52.5	+0.3337	0.5034	0.2110	+60	-21
83 B. Leonis	5.9	2.07	11.3	9 19.4		15	29.0	+ 9 57.3	-0.4005	0.5008	0.2167	+20	-62
89 B. Leonis	6.2	2.07	11.6	8 42.4		16	24.6	+10 51.4	+0.0803	0.5007	0.2173	+45	-35
$\pi$ Leonis	4.9	+2.08	-11.8	+ 8 26.4		17	33.3	+11 58.2	+0.1271	0.5003	-0.2180	+48	-32
43 Leonis	6.3	2.19	13.1	6 57.7	28	6	6.2	+ 0 10.3	-1.0154	0.4979	0.2245	-16	-83
155 B. Leonis	6.5	2.17	13.3	6 6.7		6	15.0	+ 0 18.8	-0.1104	0.4979	0.2245	+35	-46
237 B. Leonis	6.3	2.30	15.9	1 27.7		22	18.8	- 8 3.7	+1.3667	0.4970	0.2299	+80	+51
55 Leonis	6.1	2.32	16.1	1 10.5	29	0	14.2	- 6 11.5	+1.2385	0.4971	0.2304	+90	+34
$p^a$ Leonis	6.1	+2.35	-16.5	+ 0 26.5		4	37.3	- 1 55.5	+1.0327	0.4974	-0.2312	+90	+17
$p^s$ Leonis	5.3	2.41	16.7	+ 0 22.7		10	13.8	+ 3 31.7	-0.1957	0.4980	0.2318	+30	-51
388 B. Leonis	6.3	2.48	17.6	- 1 14.9		18	0.9	+11 6.0	-0.2169	0.4994	0.2321	+29	-53
$e$ Leonis	5.1	2.49	18.0	2 33.0		19	20.6	-11 36.5	+0.9030	0.4997	0.2320	+87	+ 8
431 B. Leonis	6.2	2.53	17.9	1 58.9		23	46.0	- 7 18.5	-0.7455	0.5008	0.2317	+ 1	-90
13 B. Virginis	5.9	+2.60	-19.1	- 4 52.6	30	6	38.2	- 0 37.8	+0.8308	0.5030	-0.2307	+85	+ 4
64 B. Virginis	6.5	2.71	19.9	7 19.1		17	3.8	+ 9 30.1	+1.0956	0.5071	0.2279	+83	+22
$\eta$ Virginis	5.3	2.85	20.4	9 0.0	31	5	20.6	- 2 34.4	+0.1497	0.5133	0.2224	+47	-33
370 B. Virginis	6.0	+2.98	-20.8	-11 12.3		15	53.6	+ 7 39.8	+0.2159	0.5196	-0.2156	+49	-29

JUNE.

75 Virginis	5.6	+3.22	-20.8	-14 56.5	1	10	57.4	+ 2 8.3	+0.2613	0.5334	-0.1983	+49	-27
83 Virginis	5.6	3.30	20.7	15 46.1		16	30.8	+ 7 31.0	+0.0553	0.5378	0.1918	+37	-38
85 Virginis	6.1	3.30	20.5	15 21.4		17	2.1	+ 8 1.3	-0.4814	0.5382	0.1912	+10	-71
43 H. Virginis	5.5	+3.49	-19.8	-17 49.2	2	6	51.3	- 2 37.0	-0.3858	0.5499	-0.1720	+12	-65
231 G. Virginis	6.4	3.50	19.7	18 12.3		7	36.2	- 1 53.6	-0.1072	0.5505	0.1709	+26	-47
236 G. Virginis	5.7	3.51	19.7	18 20.1		8	19.1	- 1 12.1	-0.0900	0.5511	0.1698	+26	-46
9 G. Libræ	6.5	3.63	19.2	20 4.9		15	33.0	+ 5 46.9	+0.5570	0.5574	0.1578	+62	-10
17 G. Libræ	6.4	3.70	18.7	20 49.8		20	31.4	+10 34.8	+0.5775	0.5617	0.1488	+62	- 9
18 G. Libræ	6.1	+3.70	-18.6	-20 58.9		20	58.5	+11 0.8	+0.6700	0.5621	-0.1480	+68	- 3

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
43 B. Libræ	5.7	+3.79	-18.8	-21 2.9	3 1 21.5	-8 45.5	+0.1066	0.5658	-0.1396	+33	-35
47 G. Libræ	6.1	3.81	17.4	21 42.9	5 13.9	-5 1.4	+0.2755	0.5691	0.1318	+42	-25
64 G. Libræ	5.8	3.86	16.8	22 5.9	9 25.5	-0 59.1	+0.1392	0.5726	0.1230	+33	-33
169 B. Libræ	6.0	3.96	15.2	22 52.3	18 18.0	+7 33.5	-0.0633	0.5796	0.1030	+20	-44
177 B. Libræ	6.2	3.97	15.1	22 53.0	18 56.2	+8 10.3	-0.1155	0.5800	0.1015	+18	-48
42 Libræ	5.0	+3.99	-15.1	-23 33.2	19 18.4	+8 31.7	+0.5394	0.5803	-0.1007	+55	-10
31 B. Scorpïi	5.4	4.05	14.1	24 17.4	4 0 49.7	-10 9.8	+0.7793	0.5842	0.0873	+66	+5
32 B. Scorpïi	5.3	4.04	14.0	23 44.1	0 50.9	-10 8.7	+0.2052	0.5843	0.0872	+33	-29
40 B. Scorpïi	5.4	4.08	13.7	24 35.8	2 42.6	-8 21.8	+0.9337	0.5855	0.0826	+65	+15
50 B. Scorpïi	6.4	4.09	13.2	24 30.1	4 50.9	+6 17.9	+0.6646	0.5869	0.0772	+62	-3
57 B. Scorpïi	5.7	+4.07	-12.9	-23 23.1	5 44.4	-5 26.5	-0.5527	0.5875	-0.0749	-8	-80
24 G. Scorpïi	6.2	4.10	12.8	24 14.7	6 25.8	-4 46.5	+0.2805	0.5879	0.0731	+36	-25
27 G. Scorpïi	5.8	4.08	12.7	23 28.1	6 47.2	-4 26.1	-0.5431	0.5882	0.0722	-8	-79
41 G. Scorpïi	6.3	4.11	12.3	24 12.8	8 46.5	-2 31.5	+0.0849	0.5894	0.0671	+25	-36
85 B. Scorpïi	6.0	4.14	12.2	25 16.2	9 12.6	-2 6.4	+1.1402	0.5896	0.0659	+65	+33
19 Scorpïi	4.9	+4.12	-11.7	-23 58.4	11 30.0	+0 5.6	-0.3350	0.5910	-0.0599	+2	-62
$\sigma$ Scorpïi	3.1	4.16	11.7	25 23.9	11 41.9	+0 17.0	+1.1137	0.5911	0.0593	+65	+31
$\rho$ Ophiuchi	4.7	4.11	11.2	23 15.6	13 27.5	+1 58.4	-1.1781	0.5920	0.0546	-52	-90
22 Scorpïi	4.8	4.17	10.8	24 56.2	15 15.1	+3 41.8	+0.4456	0.5929	0.0498	+45	-16
126 B. Scorpïi	6.1	4.18	9.7	24 18.6	19 43.0	+7 59.0	-0.3893	0.5951	0.0375	-3	-66
88 B. Ophiuchi	6.3	+4.22	-8.0	-24 58.2	5 2 49.2	-9 11.8	+0.0868	0.5978	-0.0176	+21	-36
26 Ophiuchi	5.8	4.22	8.0	24 51.9	2 53.7	-9 7.5	-0.0202	0.5978	0.0174	+15	-42
137 B. Ophiuchi	6.3	4.25	6.8	25 9.3	7 32.6	-4 40.0	+0.2244	0.5991	-0.0042	+27	-28
39 Ophiuchi	5.1	4.22	6.2	24 12.0	9 46.7	-2 31.3	-0.7491	0.5997	+0.0023	-26	-90
$\theta$ Ophiuchi	3.4	4.24	5.8	24 55.2	11 17.9	-1 3.8	-0.0108	0.6000	0.0066	+14	-41
191 B. Ophiuchi	6.3	+4.22	-5.5	-24 10.2	12 29.7	+0 5.1	-0.7610	0.6002	+0.0101	-26	-90
$b$ Ophiuchi	4.3	4.22	5.4	24 6.1	12 58.9	+0 33.0	-0.8251	0.6003	0.0115	-29	-90
136 G. Ophiuchi	6.3	4.27	5.3	25 52.3	13 10.0	+0 43.7	+0.9732	0.6002	0.0120	+64	+19
51 Ophiuchi	4.8	4.21	4.9	23 54.1	14 55.0	+2 24.5	-1.0005	0.6005	0.0171	-40	-90
63 Ophiuchi	6.1	4.24	2.5	24 52.3	23 52.9	+11 0.3	+0.2533	0.6009	0.0429	+32	-26
4 Sagittarii	4.8	+4.20	-2.1	-23 48.6	6 1 46.0	-11 11.2	-0.7338	0.6007	+0.0484	-19	-90
7 Sagittarii	5.5	4.21	1.7	24 17.0	2 55.8	-10 4.2	-0.1979	0.6007	0.0517	+8	-53
9 Sagittarii	6.0	4.21	1.6	24 21.8	3 19.2	-9 41.9	-0.0958	0.6006	0.0528	+14	-47
1 Sagittarii	5.2	4.18	-0.9	23 43.2	6 20.0	-6 48.4	-0.5739	0.6002	0.0614	-11	-82
70 B. Sagittarii	6.4	4.21	+0.3	24 57.2	10 4.4	-3 13.1	+0.9195	0.5996	0.0719	+65	+14
24 Sagittarii	5.7	+4.16	+1.4	-24 5.7	14 50.6	+1 21.4	+0.4284	0.5984	+0.0851	+46	-17
117 B. Sagittarii	5.8	4.13	1.8	23 34.6	16 37.9	+3 4.4	+0.0628	0.5979	0.0900	+26	-37
26 Sagittarii	6.1	4.14	2.2	23 54.7	17 55.2	+4 18.5	+0.5178	0.5975	0.0935	+53	-12
28 Sagittarii	5.6	4.08	2.4	22 28.8	19 40.5	+5 59.6	-0.7543	0.5969	0.0982	-17	-90
30 Sagittarii	6.2	4.06	2.8	22 15.4	21 25.4	+7 40.3	-0.8016	0.5963	0.1028	-19	-90
$\nu^1$ Sagittarii	5.0	+4.08	+3.2	-22 50.8	22 42.5	+8 54.3	-0.0742	0.5958	+0.1062	+20	-45
$\nu^2$ Sagittarii	5.1	4.07	3.3	22 46.5	23 4.4	+9 15.4	-0.1077	0.5957	0.1071	+18	-47
154 B. Sagittarii	5.9	4.08	3.5	23 16.8	23 25.1	+9 35.1	+0.4364	0.5955	0.1080	+49	-16
168 B. Sagittarii	6.3	4.05	4.0	22 48.7	7 1 36.8	+11 41.6	+0.2101	0.5946	0.1137	+36	-29
$\sigma$ Sagittarii	3.9	4.02	4.1	21 51.8	2 49.0	-11 9.1	-0.6046	0.5940	0.1168	-7	-85
191 B. Sagittarii	6.5	+4.05	+4.7	-23 19.3	4 23.3	-9 38.6	+1.0462	0.5934	+0.1208	+67	+23
$\pi$ Sagittarii	3.0	3.98	4.5	21 9.3	4 49.2	-9 13.7	-1.0760	0.5932	0.1219	-37	-90
199 B. Sagittarii	6.4	3.99	4.8	21 47.7	5 52.2	-8 13.2	-0.3034	0.5927	0.1245	+10	-60
222 B. Sagittarii	5.5	3.99	5.8	22 33.4	9 4.6	-5 8.4	+0.8721	0.5912	0.1324	+67	+10
50 Sagittarii	5.5	3.95	6.2	21 56.4	11 19.9	-2 58.4	+0.5583	0.5899	0.1378	+59	-10
253 B. Sagittarii	6.1	+3.92	+6.5	-21 29.0	13 9.5	-1 13.1	+0.3562	0.5890	+0.1422	+47	-21

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
		s	"	'	d h m	h m				'	"
f Sagittarii	5.1	+3.82	+ 7.6	-19 57.6	7 19 22.0	+ 4 44.8	-0.2459	0.5854	+0.1563	+16	-55
57 Sagittarii	6.0	3.78	8.0	19 15.3	21 43.5	+ 7 0.9	-0.5781	0.5841	0.1613	- 1	-81
$\pi$ Capricorni	5.2	3.60	10.7	18 28.9	8 12 8.4	- 3 7.0	+1.1838	0.5750	0.1897	+72	+33
31 B. Capricorni	6.4	3.54	10.2	16 0.8	12 45.4	- 2 31.4	-1.1721	0.5746	0.1908	-37	-90
$\rho$ Capricorni	5.0	3.59	10.7	18 5.2	12 47.3	- 2 29.6	+0.9105	0.5746	0.1908	+72	+11
47 B. Capricorni	6.2	+3.53	+10.9	-16 48.5	15 35.6	+ 0 12.5	+0.1726	0.5728	+0.1956	-42	-31
$\tau$ Capricorni	5.2	3.48	10.8	15 14.6	17 11.1	+ 1 44.4	-1.0827	0.5718	0.1983	-29	-90
61 B. Capricorni	5.9	3.49	11.2	16 25.0	17 42.6	+ 2 14.8	+0.1978	0.5714	0.1992	+44	-30
95 B. Capricorni	5.9	3.37	12.0	14 48.1	9 1 26.8	+ 9 41.9	+0.1654	0.5665	0.2110	+44	-32
53 B. Aquarii	6.5	3.25	12.8	13 32.6	8 55.9	- 7 5.0	+0.5216	0.5619	0.2210	+67	-13
18 Aquarii	5.5	+3.21	+13.2	-13 13.9	12 30.9	- 3 37.6	+1.0083	0.5598	+0.2252	+77	+16
72 B. Aquarii	6.5	3.16	13.1	11 55.5	14 18.3	- 1 54.1	+0.1013	0.5588	0.2272	-42	-35
137 B. Capricorni	6.2	3.09	13.4	10 56.8	19 17.2	+ 2 54.4	+0.2641	0.5560	0.2323	+52	-27
c <sup>1</sup> Capricorni	5.3	3.04	13.2	9 27.6	21 46.0	+ 5 18.1	-0.6514	0.5547	0.2347	+ 4	-86
c <sup>2</sup> Capricorni	6.3	3.03	13.4	9 39.4	22 19.8	+ 5 50.7	-0.3224	0.5544	0.2352	+21	-60
30 Aquarii	5.6	+2.90	+13.3	- 6 55.2	10 6 0.0	-10 44.9	-1.2480	0.5506	+0.2412	-37	-90
44 Aquarii	5.7	2.81	13.5	5 47.9	12 18.4	- 4 39.3	-0.8455	0.5479	0.2451	- 6	-90
51 Aquarii	5.8	2.77	13.6	5 15.2	15 31.2	- 1 33.0	-0.6050	0.5466	0.2468	+ 8	-80
$\kappa$ Aquarii	5.2	2.69	13.9	4 39.2	21 49.1	+ 4 32.3	+0.3505	0.5444	0.2492	+60	-22
207 B. Aquarii	6.3	2.67	13.8	3 58.9	23 13.7	+ 5 54.1	+0.0251	0.5439	0.2497	+42	-40
6 G. Piscium	6.2	+2.56	+14.0	- 2 50.2	11 7 21.7	-10 14.1	+0.9045	0.5418	+0.2512	+87	+ 8
22 B. Piscium	6.4	2.41	13.7	- 0 9.6	19 13.2	+ 1 14.1	+1.1745	0.5397	0.2509	+90	+28
$\kappa$ Piscium	4.9	2.39	13.4	+ 0 48.3	20 49.3	+ 2 47.0	+0.5955	0.5396	0.2506	+79	- 9
9 Piscium	6.4	2.39	13.5	0 40.2	20 58.3	+ 2 55.7	+0.7697	0.5395	0.2506	+90	0
16 Piscium	5.7	2.33	13.3	1 38.7	12 1 17.1	+ 7 6.1	+0.8581	0.5392	0.2496	+90	+ 6
19 Piscium	5.4	+2.27	+13.0	+ 3 1.8	6 0.0	+11 39.8	+0.6217	0.5391	+0.2480	+82	- 8
$\omega$ Piscium	4.0	2.21	12.0	6 24.4	12 5.0	- 6 27.1	-1.3238	0.5392	0.2452	-44	-83
36 Piscium	6.2	2.12	11.7	7 47.0	20 12.6	+ 1 24.6	-0.7589	0.5399	0.2404	0	-82
d Piscium	5.4	2.10	11.8	7 44.0	22 6.2	+ 3 14.4	-0.2542	0.5402	0.2390	+27	-54
136 B. Piscium	6.5	2.00	11.4	8 54.3	13 7 45.1	-11 25.6	+0.8129	0.5418	0.2311	+90	+ 5
58 Piscium	5.7	+1.98	+10.6	+11 31.5	10 27.2	- 8 48.9	-1.2590	0.5424	+0.2285	-37	-78
75 Piscium	6.3	1.90	10.3	12 30.9	19 30.7	- 0 3.4	-0.2530	0.5447	0.2189	+27	-51
$\eta$ Piscium	3.7	1.81	9.4	14 55.3	14 6 56.3	+10 59.1	-0.3207	0.5483	0.2044	+23	-53
101 Piscium	6.2	1.80	9.6	14 14.4	8 54.0	-11 7.1	+0.7828	0.5490	0.2017	+90	+ 7
105 Piscium	6.1	1.79	9.1	15 59.3	10 39.6	- 9 25.0	-0.6761	0.5496	0.1992	+ 4	-73
3 Arietis	6.4	+1.76	+ 8.8	+17 0.0	13 47.0	- 6 24.0	-1.1126	0.5507	+0.1945	-25	-73
4 Arietis	5.8	1.76	8.8	16 32.7	14 30.4	- 5 42.0	-0.5002	0.5510	0.1934	+14	-62
$\epsilon$ Arietis	5.1	1.73	8.5	17 24.9	18 38.0	- 1 42.9	-0.6201	0.5525	0.1870	+ 7	-69
35 B. Arietis	6.4	1.71	8.3	17 51.4	21 29.1	+ 1 2.2	-0.5541	0.5535	0.1823	+11	-64
47 B. Arietis	6.5	1.69	8.4	17 38.2	23 18.1	+ 2 47.5	+0.0036	0.5542	0.1793	+41	-32
20 H <sup>1</sup> . Arietis	6.4	+1.69	+ 8.5	+16 50.3	15 0 1.5	+ 3 29.4	+0.9655	0.5545	+0.1781	+90	+22
15 Arietis	5.9	1.70	7.9	19 6.7	0 33.7	+ 4 0.5	-1.3085	0.5547	0.1771	-51	-70
$\theta$ Arietis	5.6	1.67	7.7	19 31.2	3 54.0	+ 7 13.9	-1.1542	0.5559	0.1713	-31	-70
26 Arietis	6.2	1.64	7.6	19 29.4	9 26.2	-11 25.5	-0.2032	0.5580	0.1613	+30	-41
$\mu$ Arietis	5.7	1.61	7.4	19 39.6	14 35.6	- 6 26.9	+0.4247	0.5598	0.1514	+68	- 7
47 Arietis	5.8	+1.58	+ 7.0	+20 20.3	21 26.5	+ 0 9.4	+0.7053	0.5622	+0.1377	+90	+10
$\epsilon$ Arietis (mean)	4.6	1.57	6.8	21 0.7	21 56.0	+ 0 37.9	+0.0668	0.5624	0.1366	+45	-24
$\zeta$ Arietis	5.0	1.53	6.5	20 44.4	14 44.1	+ 7 11.4	+1.2348	0.5645	0.1223	+87	+52
66 Arietis	6.1	1.52	5.9	22 31.2	10 32.6	-11 12.6	+0.0322	0.5660	0.1095	+43	-23
16 Tauri	5.4	1.50	5.3	24 1.8	17 31.8	- 4 28.5	-0.8548	0.5677	0.0938	- 0	-88
17 Tauri	3.8	+1.50	+ 5.4	+23 51.3	17 33.7	- 4 26.7	-0.6655	0.5677	+0.0935	+ 3	-87



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
<i>q</i> Tauri	4.3	+1.50	+ 5.3	+24 12.6	16 17 42.0	- 4 18.7	-1.0280	0.5677	+0.0932	-22	-66
20 Tauri	4.1	1.50	5.3	24 6.6	17 57.9	- 4 3.3	-0.8990	0.5678	0.0926	-12	-66
21 Tauri	5.8	1.50	5.3	24 17.9	17 59.8	- 4 1.5	-1.0940	0.5678	0.0925	-28	-66
22 Tauri	6.5	1.50	5.3	24 16.3	18 3.4	- 3 57.9	-1.0604	0.5678	0.0924	-25	-66
23 Tauri	4.3	1.50	5.4	23 41.5	18 11.1	- 3 50.6	-0.4358	0.5678	0.0921	+16	-48
$\eta$ Tauri	3.0	+1.50	+ 5.3	+23 51.1	18 40.6	- 3 22.2	-0.5589	0.5679	+0.0909	+ 9	-56
104 B. Tauri	5.5	1.49	5.4	23 10.1	19 3.3	- 3 0.4	+0.1974	0.5680	0.0901	+53	-12
27 Tauri	3.7	1.50	5.3	23 48.1	19 23.6	- 2 40.7	-0.4427	0.5680	0.0893	+16	-48
28 Tauri	5.2	1.50	5.3	23 53.1	19 24.2	- 2 40.2	-0.5303	0.5680	0.0892	+11	-54
33 Tauri	6.0	1.48	5.2	22 56.2	22 46.6	+ 0 34.8	+0.7624	0.5686	0.0814	+90	+19
161 B. Tauri	6.5	+1.47	+ 5.1	+22 58.2	17 0 25.8	+ 2 10.7	+0.8600	0.5689	+0.0774	+90	+24
NEW MOON.											
79 Geminorum	6.3	+1.53	- 2.6	+20 30.9	21 3 22.8	+ 1 39.5	-0.2750	0.5365	-0.1423	+26	-44
209 B. Geminorum	6.2	1.54	3.0	19 32.3	6 40.2	+ 4 50.6	+0.3208	0.5345	0.1477	+60	-13
85 Geminorum	5.2	+1.55	- 3.1	+20 6.2	8 27.8	+ 6 34.8	-0.5674	0.5333	-0.1505	+10	-63
217 B. Geminorum	6.3	1.56	3.3	20 2.6	10 57.9	+ 9 0.1	-0.8840	0.5317	0.1544	-10	-70
10 H. Cancr	6.1	1.56	3.6	19 4.6	12 55.1	+10 53.6	-0.1251	0.5305	0.1573	+34	-37
$\zeta$ Cancr ( <i>mean</i> )	4.7	1.57	4.1	17 53.9	16 36.3	- 9 32.1	+0.5814	0.5283	0.1627	+81	- 1
<i>d</i> <sup>1</sup> Cancr	5.9	1.60	4.4	18 35.9	22 9.3	- 4 9.3	-1.1145	0.5249	0.1703	-26	-71
<i>d</i> <sup>2</sup> Cancr	6.2	+1.59	- 4.8	+17 19.2	23 25.1	- 2 55.9	+0.0786	0.5241	-0.1720	+45	-28
90 B. Cancr	6.3	1.61	5.5	15 36.0	22 4 38.1	+ 2 7.8	+1.0604	0.5210	0.1787	+90	+27
54 Cancr	6.3	1.65	6.0	15 39.5	12 16.3	+ 9 32.3	-0.4018	0.5168	0.1876	+19	-57
<i>o</i> <sup>1</sup> Cancr	5.1	1.68	6.3	15 38.4	15 29.3	-11 20.5	-0.9918	0.5150	0.1911	-16	-74
<i>o</i> <sup>2</sup> Cancr	5.7	1.68	6.2	15 53.9	15 39.6	-11 10.4	-1.3110	0.5149	0.1912	-48	-74
222 B. Cancr	6.3	+1.71	- 8.0	+11 50.8	23 2 21.8	- 0 46.9	+1.0672	0.5096	-0.2017	+90	+24
$\xi$ Leonis	5.1	1.75	8.6	11 39.9	9 53.1	+ 6 31.5	-0.2725	0.5063	0.2080	+26	-52
<i>o</i> Leonis	3.8	1.78	9.3	10 16.1	14 51.8	+11 21.7	+0.2313	0.5043	0.2117	+54	-26
83 B. Leonis	5.9	1.83	10.0	9 19.5	23 10.9	- 4 33.1	-0.5069	0.5013	0.2171	+14	-69
89 B. Leonis	6.2	1.84	10.3	8 42.5	24 0 6.6	- 3 38.9	-0.0253	0.5011	0.2177	+39	-40
$\pi$ Leonis	4.9	+1.84	-10.4	+ 8 26.4	1 15.4	- 2 32.0	+0.0215	0.5007	-0.2183	+42	-38
43 Leonis	6.3	1.93	11.7	6 57.7	13 50.3	+ 9 42.2	-1.1264	0.4976	0.2244	-24	-83
155 B. Leonis	6.5	1.92	11.9	6 6.7	13 59.2	+ 9 50.8	-0.2190	0.4975	0.2245	+29	-52
237 B. Leonis	6.3	2.03	14.2	1 27.7	6 7.9	+ 1 33.1	+1.2633	0.4957	0.2293	+90	+36
55 Leonis	6.1	2.05	14.4	1 10.5	8 4.1	+ 3 26.1	+1.1347	0.4956	0.2297	+90	+24
<i>p</i> <sup>3</sup> Leonis	6.1	+2.08	-14.8	+ 0 26.5	12 29.2	+ 7 44.1	+0.9287	0.4956	-0.2303	+90	+10
<i>p</i> <sup>5</sup> Leonis	5.3	2.14	15.1	+ 0 22.7	18 8.6	-10 45.7	-0.3044	0.4959	0.2307	+25	-58
388 B. Leonis	6.3	2.21	15.9	- 1 14.8	26 2 0.2	- 3 7.0	-0.3245	0.4968	0.2306	+24	-59
<i>e</i> Leonis	5.1	2.22	16.3	- 2 33.0	3 20.7	- 1 48.7	+0.8017	0.4970	0.2306	+87	+ 2
431 B. Leonis	6.2	2.27	16.3	1 58.9	7 49.1	+ 2 32.4	-0.8547	0.4978	0.2301	- 6	-90
13 B. Virginis	5.9	+2.33	-17.4	- 4 52.6	14 46.3	+ 9 18.1	+0.7326	0.4995	-0.2289	+85	- 2
64 B. Virginis	6.5	2.45	18.4	7 19.1	17 1 20.4	- 4 25.5	+1.0033	0.5030	0.2257	+83	+15
<i>q</i> Virginis	5.3	2.60	19.0	9 0.0	13 48.3	+ 7 41.2	+0.0568	0.5086	0.2200	+42	-38
370 B. Virginis	6.0	2.74	19.6	11 12.3	28 0 31.6	- 5 54.2	+0.1290	0.5145	0.2131	+45	-34
75 Virginis	5.6	3.02	20.0	14 56.5	19 55.1	-11 6.1	+0.1859	0.5278	0.1957	+45	-31
83 Virginis	5.6	+3.11	-20.0	-15 46.1	29 1 34.3	- 5 37.5	-0.0179	0.5322	-0.1893	+33	-42
85 Virginis	6.1	3.12	19.8	15 21.4	2 6.1	- 5 6.8	-0.5579	0.5326	0.1886	+ 5	-78
43 H. Virginis	5.5	3.35	19.4	17 49.2	16 8.9	+ 8 28.7	-0.4521	0.5444	0.1697	+ 8	-69
231 G. Virginis	6.4	3.37	19.4	18 12.3	16 54.5	+ 9 12.8	-0.1713	0.5451	0.1686	+22	-51
236 G. Virginis	5.7	3.38	19.4	18 20.2	17 38.1	+ 9 54.9	-0.1535	0.5457	0.1675	+23	-50
9 G. Libræ	6.5	+3.52	-19.1	-20 4.9	30 0 58.6	- 6 59.5	+0.5021	0.5522	-0.1557	+58	-13

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$								
17 G. Libræ	6.4	+3.61	-18.7	-20 49.8	30 6 1.2	-2 7.4	+0.5258	0.5567	-0.1469	+59	-12
18 G. Libræ	6.1	3.62	18.6	20 58.9	6 28.6	-1 41.0	+0.6190	0.5571	0.1461	+65	-7
43 B. Libræ	5.7	3.72	18.8	21 2.9	10 55.0	+2 36.0	+0.0559	0.5611	0.1378	+30	-38
47 G. Libræ	6.1	3.76	17.6	21 42.9	14 50.3	+6 22.9	+0.2282	0.5646	0.1302	+39	-28
64 G. Libræ	5.8	+3.83	-17.0	-22 5.9	19 4.7	+10 28.1	+0.0942	0.5683	-0.1215	+31	-36

JULY.

169 B. Libræ	6.0	+3.98	-15.6	-22 52.3	1 4 2.4	-4 54.0	-0.1028	0.5760	-0.1017	+18	-47
177 B. Libræ	6.2	3.99	15.4	22 53.0	4 40.9	-4 16.9	-0.1546	0.5765	0.1003	+15	-50
42 Libræ	5.0	+4.01	-15.5	-23 33.2	5 3.3	-3 55.4	+0.5020	0.5768	-0.0994	+53	-13
31 B. Scorpii	5.4	4.11	14.6	24 17.4	10 37.0	+1 25.6	+0.7458	0.5813	0.0862	+66	+2
32 B. Scorpii	5.3	4.09	14.4	23 44.1	10 38.2	+1 26.8	+0.1706	0.5813	0.0862	+31	-31
40 B. Scorpii	5.4	4.14	14.2	24 35.8	12 30.6	+3 14.9	+0.9014	0.5828	0.0816	+65	+12
50 B. Scorpii	6.4	4.17	13.7	24 30.1	14 39.7	+5 19.0	+0.6332	0.5844	0.0762	+60	-5
57 B. Scorpii	5.7	+4.15	-13.3	-23 23.1	15 33.4	+6 10.7	-0.5848	0.5851	-0.0740	-10	-83
24 G. Scorpii	6.2	4.18	13.3	24 14.7	16 15.1	+6 50.7	+0.2497	0.5856	0.0722	+35	-26
27 G. Scorpii	5.8	4.17	13.1	23 28.1	16 36.5	+7 11.3	-0.5744	0.5858	0.0713	-10	-82
41 G. Scorpii	6.3	4.21	12.8	24 12.9	18 36.3	+9 6.5	+0.0554	0.5873	0.0662	+23	-38
85 B. Scorpii	6.0	4.25	12.9	25 16.2	19 2.5	+9 31.6	+1.1115	0.5875	0.0651	+65	+30
19 Scorpii	4.9	+4.24	-12.1	-23 58.4	21 20.4	+11 44.1	-0.3628	0.5891	-0.0591	0	-64
♄ Scorpii	3.1	4.28	12.3	25 23.9	21 32.3	+11 55.5	+1.0863	0.5893	0.0585	+65	+28
♅ Ophiuchi	4.7	4.24	11.5	23 15.6	23 18.3	-10 22.7	-1.2044	0.5904	0.0539	-55	-88
22 Scorpii	4.8	4.31	11.4	24 56.2	2 1 6.1	-8 39.1	+0.4201	0.5916	0.0491	+43	-17
126 B. Scorpii	6.1	4.34	10.2	24 18.6	5 34.2	-4 21.8	-0.4113	0.5942	0.0369	-4	-68
88 B. Ophiuchi	6.3	+4.44	-8.4	-24 58.2	12 39.9	+2 26.8	+0.0686	0.5978	-0.0170	+20	-37
26 Ophiuchi	5.8	4.44	8.4	24 51.9	12 44.4	+2 31.2	-0.0381	0.5979	0.0168	+14	-43
137 B. Ophiuchi	6.3	4.49	7.2	25 9.3	17 22.4	+6 57.9	+0.2087	0.5998	-0.0035	+26	-29
39 Ophiuchi	5.1	4.47	6.4	24 12.0	19 35.9	+9 5.9	-0.7603	0.6006	+0.0029	-26	-90
♄ Ophiuchi	3.4	4.51	6.1	24 55.2	21 6.6	+10 32.9	-0.0235	0.6012	0.0073	+14	-42
191 B. Ophiuchi	6.3	+4.50	-5.6	-24 10.2	22 18.0	+11 41.3	-0.7702	0.6014	+0.0107	-26	-90
♄ Ophiuchi	4.3	4.50	5.6	24 6.1	22 47.0	-11 50.9	-0.8336	0.6016	0.0121	-30	-90
136 G. Ophiuchi	6.3	4.56	5.7	25 52.3	22 58.1	-11 40.2	+0.9578	0.6016	0.0127	+64	+17
51 Ophiuchi	4.8	4.50	5.0	23 54.1	3 0 42.3	-10 0.2	-1.0069	0.6021	0.0177	-41	-90
63 Ophiuchi	6.1	4.59	2.5	24 52.3	9 35.6	-1 28.9	+0.2466	0.6036	0.0437	+32	-27
4 Sagittarii	4.8	+4.56	-1.9	-23 48.6	11 27.5	+0 18.4	-0.7337	0.6038	+0.0492	-21	-90
7 Sagittarii	5.5	4.58	1.6	24 17.0	12 36.5	+1 24.6	-0.2002	0.6038	0.0525	+8	-53
9 Sagittarii	6.0	4.59	1.5	24 21.8	12 59.6	+1 46.6	-0.0986	0.6039	0.0537	+14	-47
1 Sagittarii	5.2	4.58	-0.6	23 43.2	15 58.2	+4 37.9	-0.5718	0.6039	0.0623	-10	-82
70 B. Sagittarii	6.4	4.63	+0.4	24 57.2	19 39.7	+8 10.2	+0.9132	0.6037	0.0729	+65	+13
24 Sagittarii	5.7	+4.61	+1.9	-24 5.7	4 0 21.6	-11 19.5	+0.4278	0.6031	+0.0863	+46	-16
117 B. Sagittarii	5.8	4.59	2.3	23 34.6	2 7.2	-9 38.3	+0.0661	0.6028	0.0913	-26	-37
26 Sagittarii	6.1	4.60	2.7	23 54.7	3 23.2	-8 25.4	+0.5179	0.6026	0.0948	+53	-12
28 Sagittarii	5.6	4.56	3.3	22 28.7	5 6.8	-6 46.2	-0.7423	0.6022	0.0996	-17	-90
30 Sagittarii	6.2	4.54	3.7	22 15.4	6 49.8	-5 7.3	-0.7880	0.6018	0.1043	-19	-90
♄ Sagittarii	5.0	+4.57	+4.1	-22 50.8	8 5.4	-3 54.8	-0.0666	0.6014	+0.1077	+20	-45
♄ Sagittarii	5.1	4.57	4.2	22 46.5	8 27.0	-3 34.1	-0.0996	0.6013	0.1087	+19	-47
154 B. Sagittarii	5.9	4.58	4.3	23 16.8	8 47.2	-3 14.7	+0.4397	0.6012	0.1096	+49	-16
168 B. Sagittarii	6.3	4.56	4.9	22 48.7	10 56.5	-1 10.7	+0.2165	0.6006	0.1154	+36	-29
♄ Sagittarii	3.9	4.53	5.2	21 51.8	12 7.3	-0 2.8	-0.5897	0.6001	0.1185	-6	-83
191 B. Sagittarii	6.5	+4.58	+5.7	-23 19.2	13 39.7	+1 25.8	+1.0457	0.5996	+0.1226	+67	+23

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STAR'S						AT CONJUNCTION IN R. A.						Limiting Par- allels.	
Name.		Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.	
			$\Delta\alpha$	$\Delta\delta$									
			s	"	"	d	h	m	h	m		"	"
$\pi$	Sagittarii	3.0	+4.50	+ 5.8	-21 9.3	4	14	5.0	+ 1 50.1	-1.0553	0.5995	+0.1237	-35 -90
199 B.	Sagittarii	6.4	4.52	6.0	21 47.7	15	6.8	+ 2 49.4	-0.2899	0.5991	0.1263	+11 -59	
222 B.	Sagittarii	5.5	4.54	6.9	22 33.4	18	15.2	+ 5 50.1	+0.8748	0.5979	0.1344	+67 +10	
50	Sagittarii	5.5	4.51	7.6	21 56.4	20	27.5	+ 7 57.2	+0.5653	0.5969	0.1399	+60 - 9	
253 B.	Sagittarii	6.1	4.50	8.0	21 29.0	22	14.6	+ 9 39.9	+0.3661	0.5961	0.1443	+48 -21	
f	Sagittarii	5.1	+4.42	+ 9.5	-19 57.5	5	4	18.3	- 8 31.0	-0.2264	0.5932	+0.1587	+17 -54
57	Sagittarii	6.0	4.39	10.0	19 15.2	6	36.3	- 6 18.5	-0.5535	0.5919	0.1640	0 -78	
$\pi$	Capricorni	5.2	4.28	13.3	18 28.9	20	38.3	+ 7 10.7	+1.1915	0.5838	0.1929	+72 +33	
31 B.	Capricorni	6.4	4.21	13.2	16 0.8	21	14.2	+ 7 45.1	-1.1330	0.5835	0.1940	-33 -90	
$\rho$	Capricorni	5.0	4.26	13.4	18 5.1	21	16.0	+ 7 46.9	+0.9220	0.5834	0.1941	+72 +12	
47 B.	Capricorni	6.2	+4.21	+13.8	-16 48.5	23	59.6	+10 24.2	+0.1949	0.5817	+0.1990	+44 -30	
r	Capricorni	5.2	4.16	13.9	15 14.6	6	1	32.3	+11 53.5	-1.0429	0.5808	0.2018	-25 -90
61 B.	Capricorni	5.9	4.18	14.3	16 25.0	2	3.0	-11 37.2	+0.2205	0.5805	0.2026	+45 -29	
95 B.	Capricorni	5.9	4.08	15.5	14 48.0	9	33.6	- 4 23.4	+0.1909	0.5758	0.2147	+45 -30	
53 B.	Aquarii	6.5	3.99	16.6	13 32.5	16	49.3	+ 2 36.2	+0.5441	0.5712	0.2248	+68 -12	
18	Aquarii	5.5	+3.95	+17.2	-13 13.8	20	17.8	+ 5 57.0	+1.0248	0.5692	+0.2292	+77 +17	
72 B.	Aquarii	6.5	3.91	17.2	11 55.4	22	1.9	+ 7 37.3	+0.1311	0.5681	0.2312	+44 -34	
137 B.	Capricorni	6.2	3.85	17.7	10 56.8	7	2	51.8	+11 43.3	+0.2928	0.5653	0.2364	+54 -25
c <sup>1</sup>	Capricorni	5.3	3.80	17.7	9 27.5	5	16.0	- 9 24.2	-0.6092	0.5639	0.2388	+ 6 -81	
c <sup>2</sup>	Capricorni	6.3	3.80	17.9	9 39.3	5	48.9	- 8 52.5	-0.2848	0.5636	0.2392	+23 -57	
30	Aquarii	5.6	+3.69	+18.2	- 6 55.1	13	15.3	- 1 42.0	-1.1960	0.5596	+0.2453	-31 -90	
44	Aquarii	5.7	3.61	18.6	5 47.8	19	22.5	+ 4 12.4	-0.7986	0.5566	0.2491	- 3 -90	
51	Aquarii	5.8	3.57	18.8	5 15.1	22	29.7	+ 7 13.0	-0.5612	0.5552	0.2507	+10 -76	
$\kappa$	Aquarii	5.2	3.50	19.1	4 39.1	8	4	36.9	-10 52.3	+0.3821	0.5526	0.2530	+63 -21
207 B.	Aquarii	6.3	3.48	19.1	3 58.8	5	59.2	- 9 32.9	+0.0610	0.5520	0.2534	+44 -37	
6 G.	Piscium	6.2	+3.39	+19.4	- 2 50.1	13	54.2	- 1 54.0	+0.9299	0.5493	+0.2547	+87 +10	
3	Piscium	6.3	3.36	18.7	0 15.3	14	59.4	- 0 51.0	-1.3737	0.5490	0.2548	-52 -78	
22 B.	Piscium	6.4	3.25	19.3	0 9.5	9	1	28.3	+ 9 16.6	+1.1978	0.5462	0.2539	+90 +30
$\kappa$	Piscium	4.9	3.23	19.0	+ 0 48.4	3	2.2	+10 47.4	+0.6253	0.5459	0.2535	+82 - 8	
9	Piscium	6.4	3.23	19.1	0 40.3	3	10.9	+10 55.8	+0.7975	0.5459	0.2535	+90 + 2	
16	Piscium	5.7	+3.18	+19.0	+ 1 38.8	7	24.1	- 8 59.5	+0.8852	0.5452	+0.2522	+90 + 7	
19	Piscium	5.4	3.13	18.7	3 1.9	12	1.2	- 4 31.6	+0.6513	0.5446	0.2504	+85 - 6	
$\omega$	Piscium	4.0	3.07	17.6	6 24.5	17	59.2	+ 1 14.5	-1.2765	0.5440	0.2473	-38 -84	
36	Piscium	6.2	2.99	17.3	7 47.1	10	1	58.8	+ 8 58.1	-0.7187	0.5438	0.2419	+ 3 -82
d	Piscium	5.4	2.97	17.3	7 44.1	3	50.6	+10 46.2	-0.2184	0.5439	0.2405	+29 -51	
136 B.	Piscium	6.5	+2.87	+16.8	+ 8 54.4	13	22.0	- 4 1.4	+0.8401	0.5445	+0.2321	+90 + 7	
58	Piscium	5.7	2.86	15.9	11 31.6	16	2.3	- 1 26.4	-1.2196	0.5448	0.2294	-33 -78	
75	Piscium	6.3	2.78	15.4	12 31.0	11	1	1.1	+ 7 14.4	-0.2218	0.5461	0.2193	+29 -49
$\eta$	Piscium	3.7	2.68	14.2	14 55.3	12	23.1	- 5 46.7	-0.2921	0.5484	0.2042	+25 -51	
101	Piscium	6.2	2.66	14.3	14 14.5	14	20.3	- 3 53.4	+0.8079	0.5489	0.2014	+90 + 9	
105	Piscium	6.1	+2.66	+13.6	+15 59.3	16	5.7	- 2 11.6	-0.6476	0.5493	+0.1989	+ 6 -72	
3	Arietis	6.4	2.64	13.1	17 0.1	19	12.9	+ 0 49.3	-1.0842	0.5501	0.1941	-23 -73	
4	Arietis	5.8	2.63	13.2	16 32.8	19	56.2	+ 1 31.1	-0.4732	0.5503	0.1930	+15 -61	
$\tau$	Arietis	5.1	2.60	12.7	17 25.0	12	0	3.8	+ 5 30.1	-0.5942	0.5514	0.1864	+ 8 -67
35 B.	Arietis	6.4	2.57	12.4	17 51.5	2	55.0	+ 8 15.5	-0.5291	0.5521	0.1817	+12 -62	
47 B.	Arietis	6.5	+2.55	+12.4	+17 38.3	4	44.2	+10 1.0	+0.0276	0.5527	+0.1786	+42 -31	
20 H.	Arietis	6.4	2.55	12.5	16 50.3	5	27.7	+10 42.9	+0.9887	0.5529	0.1773	+90 +23	
15	Arietis	5.9	2.56	11.8	19 6.7	6	0.0	+11 14.1	-1.2840	0.5530	0.1764	-46 -71	
$\theta$	Arietis	5.6	2.53	11.5	19 31.3	9	20.8	- 9 32.0	-1.1310	0.5540	0.1705	-28 -70	
26	Arietis	6.2	2.49	11.2	19 29.4	14	54.2	- 4 10.2	-0.1816	0.5556	0.1604	+31 -40	
$\mu$	Arietis	5.7	+2.44	+10.7	+19 39.7	20	5.3	+ 0 50.1	+0.4457	0.5571	+0.1504	+69 - 6	

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y'</i>	<i>z'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
		$\Delta\alpha$	$\Delta\delta$								
		<i>s</i>	<i>"</i>	<i>s</i> <i>'</i>	<i>d</i> <i>h</i> <i>m</i>	<i>h</i> <i>m</i>				<i>"</i>	<i>"</i>
47 Arietis	5.8	+2.40	+10.0	+20 20.4	13 2 59.0	+7 29.3	+0.7256	0.5589	+0.1367	+90	+11
$\epsilon$ Arietis ( <i>mean</i> )	4.6	2.40	9.8	21 0.7	3 28.8	+7 58.1	+0.0859	0.5590	0.1357	+46	-23
$\zeta$ Arietis	5.0	2.34	9.2	20 44.4	10 20.2	-9 25.1	+1.2555	0.5608	0.1212	+83	+54
66 Arietis	6.1	2.31	8.2	22 31.3	16 12.0	-3 45.7	+0.0487	0.5621	0.1085	+44	-22
16 Tauri	5.4	2.28	-7.2	24 1.9	23 15.5	+3 2.6	-0.8426	0.5634	0.0927	-8	-66
17 Tauri	3.8	+2.27	+7.2	+23 51.3	23 17.6	+3 4.6	-0.6527	0.5634	+0.0926	+4	-62
<i>q</i> Tauri	4.3	2.28	7.1	24 12.6	23 25.9	+3 12.6	-1.0164	0.5634	0.0923	-21	-66
20 Tauri	4.1	2.27	7.1	24 6.7	23 42.0	+3 28.2	-0.8871	0.5635	0.0917	-11	-66
21 Tauri	5.8	2.28	7.1	24 17.9	23 43.9	+3 30.0	-1.0827	0.5635	0.0916	-27	-66
22 Tauri	6.5	2.27	7.1	24 16.3	23 47.6	+3 33.6	-1.0491	0.5635	0.0915	-24	-66
23 Tauri	4.3	+2.27	+7.2	+23 41.6	23 55.3	+3 41.0	-0.4224	0.5635	+0.0912	+17	-47
$\eta$ Tauri	3.0	2.26	7.1	23 51.1	14 0 25.2	+4 9.8	-0.5460	0.5636	0.0901	+10	-55
104 B. Tauri	5.5	2.25	7.3	23 10.1	0 48.0	+4 31.7	+0.2129	0.5637	0.0892	+54	-12
27 Tauri	3.7	2.26	7.1	23 48.2	1 8.6	+4 51.7	-0.4295	0.5637	0.0884	+16	-47
28 Tauri	5.2	2.26	7.1	23 53.2	1 9.2	+4 52.2	-0.5174	0.5637	0.0884	+12	-53
33 Tauri	6.0	+2.22	+7.0	+22 56.3	4 33.9	+8 9.6	+0.7794	0.5643	+0.0805	+90	+20
161 B. Tauri	6.5	2.21	6.8	22 58.2	6 14.3	+9 46.3	+0.8772	0.5644	0.0766	+90	+27
36 Tauri	5.6	2.21	6.5	23 52.8	7 41.7	+11 10.7	+0.0170	0.5646	0.0732	+42	-20
$\chi$ Tauri	5.3	2.18	5.4	25 26.2	15 30.5	-5 17.5	-1.1442	0.5652	0.0548	-34	-65
62 Tauri	6.1	2.16	5.6	24 6.6	16 8.2	-4 41.0	+0.3067	0.5653	0.0533	+60	-3
95 Tauri	6.2	+2.10	+4.8	+23 56.0	15 0 24.6	+3 17.6	+0.8566	0.5653	+0.0335	+90	+29
315 B. Tauri	6.3	2.07	4.2	24 27.7	6 1.0	+8 41.8	+0.4413	0.5650	0.0200	+70	+7
99 Tauri	6.0	2.06	4.2	23 49.3	6 41.6	+9 21.0	+1.1432	0.5649	0.0184	+90	+51
$k$ Tauri	5.6	2.07	4.0	24 55.5	6 49.4	+9 28.6	-0.0405	0.5649	0.0180	+38	-18
103 Tauri	5.5	2.04	3.7	24 9.4	11 8.0	-10 22.2	-0.8408	0.5644	+0.0077	+90	+31
118 Tauri	5.4	+2.00	+2.6	+25 5.1	20 17.6	-1 32.2	-0.1884	0.5628	-0.0142	+30	-26
121 Tauri	5.1	1.97	2.5	23 59.2	23 0.1	+1 4.6	+0.9527	0.5622	0.0206	+90	+37
125 Tauri	5.1	1.99	2.0	25 51.1	16 0 50.5	+2 51.0	-1.1080	0.5617	0.0249	-30	-64
132 Tauri	5.0	1.95	1.8	24 32.5	4 55.6	+6 47.4	+0.1897	0.5606	0.0344	+52	-8
412 B. Tauri	5.8	1.93	1.6	24 14.3	8 25.0	+10 9.5	+0.3836	0.5595	0.0425	+66	+2
5 Geminorum	5.9	+1.90	+0.8	+24 26.4	14 52.6	-7 36.5	-0.1561	0.5573	-0.0571	+32	-28
NEW MOON.											
$\xi$ Leonis	5.1	+1.72	-8.0	+11 39.9	20 16 44.4	-8 49.6	-0.2514	0.5075	-0.2082	+27	-51
$\sigma$ Leonis	3.8	1.72	8.5	10 16.1	21 42.9	-3 59.5	+0.2548	0.5055	0.2119	+55	-24
83 B. Leonis	5.9	+1.75	-9.2	+9 19.5	21 6 1.8	+4 5.4	-0.4825	0.5026	-0.2174	+15	-67
89 B. Leonis	6.2	1.75	9.5	8 42.5	6 57.5	+4 59.5	+0.0003	0.5023	0.2179	+41	-39
$\pi$ Leonis	4.9	1.75	9.5	8 26.4	8 6.3	+6 6.4	+0.0475	0.5020	0.2186	+43	-36
43 Leonis	6.3	1.80	10.6	6 57.7	20 41.2	-5 39.4	-1.0997	0.4986	0.2246	-22	-83
155 B. Leonis	6.5	1.79	10.8	6 6.8	20 50.1	-5 30.8	-0.1897	0.4986	0.2247	+31	-50
237 B. Leonis	6.3	+1.86	-12.6	+1 27.7	22 13 0.3	+10 13.1	+1.3025	0.4962	-0.2292	+90	+41
55 Leonis	6.1	1.87	12.8	1 10.6	14 56.8	-11 53.6	+1.1741	0.4960	0.2295	+90	+27
$p^3$ Leonis	6.1	1.90	13.2	0 26.6	19 22.8	-7 34.8	+0.9690	0.4958	0.2301	+90	+12
$p^5$ Leonis	5.3	1.94	13.4	+0 22.7	23 1 3.4	-2 3.3	-0.2672	0.4958	0.2304	+27	-56
388 B. Leonis	6.3	1.99	14.1	-1 14.8	8 57.6	+5 37.9	-0.2852	0.4962	0.2301	+26	-57
$e$ Leonis	5.1	+2.00	-14.5	-2 33.0	10 18.5	+6 56.7	+0.8467	0.4963	-0.2300	+87	+5
431 B. Leonis	6.2	2.04	14.5	1 58.9	14 48.7	+11 19.5	-0.8167	0.4968	0.2294	-3	-90
13 B. Virginis	5.9	2.09	15.6	4 52.6	21 49.3	-5 51.3	+0.7813	0.4981	0.2279	+85	+1
64 B. Virginis	6.5	2.19	16.6	7 19.0	24 8 29.6	+4 31.4	+1.0570	0.5008	0.2245	+83	+18
$q$ Virginis	5.3	2.32	17.1	8 59.9	21 7.2	-7 12.2	-0.1068	0.5053	0.2183	+44	-35
370 B. Virginis	6.0	+2.45	-17.8	-11 12.2	25 8 0.5	+3 22.3	+0.1815	0.5104	-0.2112	+47	-31

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y'</i>	<i>z'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
47 B. Arietis	6.5	+3.44	+17.1	+17 38.4	8 10 53.4	- 6 2.4	-0.0768	0.5582	+0.1803	+37	-37
20 H. Arietis	6.4	3.43	17.2	16 50.4	11 36.1	- 5 21.2	+0.8739	0.5584	0.1790	+90	+15
θ Arietis	5.6	3.42	16.0	19 31.3	15 24.8	- 1 40.6	-1.2236	0.5590	0.1720	-38	-70
26 Arietis	6.2	3.38	15.4	19 29.5	20 52.3	+ 3 35.4	-0.2841	0.5600	0.1616	+25	-46
μ Arietis	5.7	3.34	14.8	19 39.8	9 1 58.4	+ 8 30.6	+0.3377	0.5609	0.1515	+61	-11
47 Arietis	5.8	+3.30	+13.8	+20 20.4	8 46.3	- 8 56.1	+0.6165	0.5620	+0.1375	+85	+ 5
s Arietis (mean)	4.6	3.29	13.6	21 0.8	9 15.7	- 8 27.7	-0.0180	0.5621	0.1365	+40	-28
ζ Arietis	5.0	3.23	12.8	20 44.5	16 2.4	- 1 55.6	+1.1444	0.5630	0.1219	+90	+42
66 Arietis	6.1	3.21	11.4	22 31.3	21 50.8	+ 3 40.4	-0.0525	0.5638	0.1090	+38	-27
16 Tauri	5.4	3.17	10.0	24 1.9	10 4 51.3	+10 25.8	-0.9373	0.5644	0.0931	-15	-66
17 Tauri	3.8	+3.17	+10.0	+23 51.4	4 53.3	+10 27.7	-0.7484	0.5644	+0.0931	- 2	-66
q Tauri	4.3	3.17	9.9	24 12.6	5 1.5	+10 35.6	-1.1102	0.5644	0.0928	-30	-66
20 Tauri	4.1	3.17	9.9	24 6.7	5 17.6	+10 51.2	-0.9815	0.5644	0.0921	-18	-66
21 Tauri	5.8	3.17	9.8	24 17.9	5 19.5	+10 53.0	-1.1760	0.5644	0.0921	-37	-66
22 Tauri	6.5	3.17	9.8	24 16.4	5 23.1	+10 56.4	-1.1426	0.5644	0.0919	-33	-66
23 Tauri	4.3	+3.16	+10.0	+23 41.6	5 30.8	+11 3.9	-0.5191	0.5644	+0.0916	+12	-53
7 Tauri	3.0	3.16	9.9	23 51.1	6 0.5	+11 32.5	-0.6419	0.5645	0.0905	+ 4	-62
104 B. Tauri	5.5	3.14	10.1	23 10.2	6 23.2	+11 54.3	+0.1131	0.5645	0.0896	+47	-17
27 Tauri	3.7	3.15	9.8	23 48.2	6 43.7	-11 45.9	-0.5259	0.5645	0.0888	+11	-53
28 Tauri	5.2	3.15	9.8	23 53.2	6 44.3	-11 45.3	-0.6134	0.5645	0.0888	+ 6	-59
33 Tauri	6.0	+3.10	+ 9.7	+22 56.3	10 7.9	- 8 29.0	+0.6782	0.5646	+0.0809	+90	+14
161 B. Tauri	6.5	3.09	9.4	22 58.2	11 47.8	- 6 52.7	+0.7763	0.5647	0.0770	+90	+20
36 Tauri	5.6	3.09	8.9	23 52.8	13 14.9	- 5 28.7	-0.0795	0.5647	0.0736	+36	-25
χ Tauri	5.3	3.05	7.3	25 26.2	21 2.5	+ 2 1.9	-1.2341	0.5646	0.0552	-47	-65
62 Tauri	6.1	3.02	7.6	24 6.6	21 40.1	+ 2 38.3	+0.2124	0.5646	0.0537	+54	- 8
95 Tauri	6.2	+2.94	+ 6.5	+23 56.1	11 5 56.3	+10 36.5	+0.7648	0.5640	+0.0339	+90	+24
315 B. Tauri	6.3	2.90	5.5	24 27.7	11 33.0	- 7 58.9	+0.3534	0.5634	0.0205	+63	+ 2
99 Tauri	6.0	2.88	5.6	23 49.3	12 13.8	- 7 19.6	+1.0545	0.5632	0.0188	+90	+44
k Tauri	5.6	2.90	5.2	24 55.5	12 21.6	- 7 12.0	-0.1272	0.5632	0.0185	+33	-23
103 Tauri	5.5	2.84	4.9	24 9.5	16 40.8	- 3 2.1	+0.7552	0.5625	+0.0082	+90	+26
118 Tauri	5.4	+2.78	+ 3.3	+25 5.1	12 1 52.4	+ 5 50.0	-0.2678	0.5604	-0.0135	+25	-31
121 Tauri	5.1	2.73	3.2	23 59.2	4 35.7	+ 8 27.6	+0.8747	0.5597	0.0199	+90	+32
125 Tauri	5.1	2.75	2.4	25 51.1	6 26.6	+10 14.6	-1.1845	0.5591	0.0241	-40	-64
132 Tauri	5.0	2.68	2.2	24 32.5	10 33.0	- 9 47.8	+0.1159	0.5579	0.0336	+48	-12
412 B. Tauri	5.8	2.65	1.8	24 14.3	14 3.5	- 6 24.6	+0.3122	0.5568	0.0416	+60	- 2
1 Geminorum	4.3	+2.60	+ 1.6	+23 16.2	17 16.1	- 3 18.7	+1.2215	0.5556	-0.0487	+85	+57
3 Geminorum	5.6	2.58	1.3	23 7.7	19 46.4	- 0 53.5	+1.2465	0.5547	0.0543	+81	+60
5 Geminorum	5.9	2.60	0.8	24 26.4	20 33.5	- 0 8.1	-0.2233	0.5544	0.0560	+28	-32
8 Geminorum	6.1	2.57	0.7	23 59.9	22 42.5	+ 1 56.4	+0.1321	0.5536	0.0607	+49	-13
9 Geminorum	6.2	2.56	0.7	23 46.2	23 0.5	+ 2 13.8	+0.3618	0.5534	0.0614	+64	- 1
36 B. Geminorum	6.0	+2.52	+ 0.3	+23 22.5	13 2 52.6	+ 5 58.1	+0.5402	0.5519	-0.0697	+78	+ 7
52 B. Geminorum	6.5	2.50	- 0.7	24 39.6	8 15.6	+11 10.0	-1.2705	0.5496	0.0811	-54	-65
d Geminorum	5.2	2.40	0.9	21 51.6	14 46.5	- 6 32.3	+1.2212	0.5466	0.0943	+87	+53
87 B. Geminorum	5.8	2.43	1.4	23 42.0	14 57.1	- 6 22.0	-0.8109	0.5465	0.0947	- 6	-66
MARS	1.7	...	...	23 34.5	15 59.9	- 5 21.4	-0.7754	0.5166	0.0949	- 4	-66
44 Geminorum	5.9	+2.37	- 1.9	+22 45.7	21 8.6	- 0 22.9	-0.4076	0.5434	-0.1068	+18	-47
120 B. Geminorum	6.5	2.33	2.2	21 23.5	23 25.5	+ 1 49.5	+0.8476	0.5423	0.1111	+90	+21
δ Geminorum	3.5	2.31	2.7	22 8.1	4 7.3	+ 6 22.1	-0.5109	0.5400	0.1197	+12	-55
56 Geminorum	5.2	2.27	2.5	20 36.0	5 0.8	+ 7 13.7	+1.0690	0.5395	0.1213	+90	+35
149 B. Geminorum	6.4	2.27	3.0	21 42.1	7 19.9	+ 9 28.4	-0.4279	0.5383	0.1255	+17	-51
61 Geminorum	5.8	+2.26	- 2.7	+20 25.4	7 23.1	+ 9 31.5	+0.9714	0.5383	-0.1256	+90	+27



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

THE STAR'S					AT CONJUNCTION IN R. A.							Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.		
		$\Delta\alpha$	$\Delta\delta$										
		s	"	"	d h m	h m				"	"		
63 Geminorum	5.3	+2.28	-3.0	+21 36.9	14 7 45.0	+ 9 52.7	-0.3856	0.5381	-0.1263	+19	-48		
79 Geminorum	6.3	2.21	3.7	20 30.9	16 8.5	- 5 59.8	-0.2944	0.5338	0.1405	+24	-45		
209 B. Geminorum	6.2	2.17	4.0	19 32.2	19 27.9	- 2 46.8	+0.3082	0.5320	0.1458	+59	-13		
85 Geminorum	5.2	2.17	4.2	20 6.2	21 16.4	- 1 1.7	-0.5822	0.5311	0.1487	+ 8	-63		
217 B. Geminorum	6.3	2.16	4.5	20 2.6	23 47.8	+ 1 25.0	-0.8970	0.5297	0.1526	-11	-70		
10 H. Cancrī	6.1	+2.13	-4.6	+19 4.6	15 1 46.0	+ 3 19.6	-0.1322	0.5287	-0.1555	+33	-37		
5 Cancrī (mean)	4.7	2.10	4.8	17 53.9	5 29.0	+ 6 55.7	+0.5821	0.5268	0.1610	+81	0		
NEW MOON.													
p <sup>5</sup> Leonis	5.3	+1.87	-12.2	+ 0 22.7	19 7 7.3	+ 5 48.1	-0.1579	0.4975	-0.2300	+32	-49		
388 B. Leonis	6.3	+1.89	-12.8	- 1 14.8	15 0.7	-10 31.4	-0.1666	0.4978	-0.2297	+32	-50		
e Leonis	5.1	1.89	13.0	2 32.9	16 21.6	- 9 12.7	+0.9694	0.4979	0.2296	+87	+13		
431 B. Leonis	6.2	1.92	13.1	1 58.8	20 51.6	- 4 50.1	-0.6928	0.4984	0.2289	+ 4	-89		
13 B. Virginis	5.9	1.94	13.8	4 52.5	20 3 52.1	+ 1 58.9	+0.9171	0.4994	0.2274	+85	+ 9		
64 B. Virginis	6.5	2.00	14.6	7 19.0	14 33.2	-11 37.6	+1.2053	0.5017	0.2238	+83	+31		
g Virginis	5.3	+2.09	-15.2	- 8 59.9	21 3 13.2	+ 0 41.1	+0.2634	0.5056	-0.2175	+53	-27		
370 B. Virginis	6.0	2.19	15.8	11 12.2	14 10.3	+11 19.5	+0.3471	0.5099	0.2101	+57	-22		
75 Virginis	5.6	2.42	16.5	14 56.5	22 10 7.5	+ 6 41.6	+0.4190	0.5200	0.1920	+58	-18		
83 Virginis	5.6	2.49	16.5	15 46.0	15 58.7	-11 37.9	+0.2143	0.5234	0.1854	+46	-29		
85 Virginis	6.1	2.50	16.4	15 21.3	16 31.7	-11 5.9	-0.3355	0.5237	0.1848	+16	-60		
43 H. Virginis	5.5	+2.70	-16.4	-17 49.1	23 7 8.6	+ 3 3.7	-0.2248	0.5331	-0.1658	+20	-54		
231 G. Virginis	6.4	2.72	16.4	18 12.3	7 56.3	+ 3 49.9	+0.0619	0.5336	0.1647	+34	-37		
236 G. Virginis	5.7	2.73	16.4	18 20.2	8 41.8	+ 4 33.9	+0.0801	0.5341	0.1636	+35	-36		
9 G. Libræ	6.5	2.86	16.4	20 4.8	16 22.6	+11 59.8	+0.7503	0.5394	0.1518	+70	+ 2		
17 G. Libræ	6.4	2.95	16.3	20 49.8	21 39.8	- 6 53.3	+0.7744	0.5432	0.1432	+69	+ 3		
18 G. Libræ	6.1	+2.96	-16.2	-20 58.9	22 8.6	- 6 25.6	+0.8697	0.5436	-0.1424	+69	+ 9		
43 B. Libræ	5.7	3.08	16.9	21 2.8	24 2 48.5	- 1 54.9	+0.2931	0.5469	0.1342	+44	-24		
47 G. Libræ	6.1	3.12	15.6	21 42.8	6 55.8	+ 2 4.1	+0.4684	0.5499	0.1268	+53	-15		
64 G. Libræ	5.8	3.19	15.1	22 5.8	11 23.8	+ 6 22.9	+0.3297	0.5531	0.1183	+44	-22		
169 B. Libræ	6.0	3.36	14.2	22 52.3	20 50.6	- 8 30.2	+0.1238	0.5599	0.0992	+30	-34		
177 B. Libræ	6.2	+3.37	-14.1	-22 53.0	21 31.3	- 7 50.9	+0.0702	0.5604	-0.0978	+27	-37		
42 Libræ	5.0	3.39	14.3	23 33.2	21 54.9	- 7 28.1	+0.7425	0.5606	0.0969	+66	+ 2		
31 B. Scorpīi	5.4	3.51	13.6	24 17.4	3 47.2	- 1 48.5	+0.9885	0.5647	0.0841	+66	+19		
32 B. Scorpīi	5.3	3.50	13.4	23 44.1	3 48.5	- 1 47.2	+0.3996	0.5647	0.0841	+45	-18		
40 B. Scorpīi	5.4	3.55	13.4	24 35.8	5 47.1	+ 0 7.1	+1.1466	0.5662	0.0797	+65	+34		
δ Scorpīi	2.5	+3.51	-12.5	-22 23.4	6 33.8	+ 0 52.1	-1.2439	0.5666	-0.0779	-57	-83		
50 B. Scorpīi	6.4	3.59	13.0	24 30.1	8 3.4	+ 2 18.4	+0.8704	0.5676	0.0745	+65	+11		
57 B. Scorpīi	5.7	3.58	12.4	23 23.0	9 0.2	+ 3 13.2	-0.3776	0.5682	0.0723	+1	-65		
24 G. Scorpīi	6.2	3.61	12.6	24 14.7	9 44.2	+ 3 55.6	+0.4764	0.5687	0.0706	+49	-14		
27 G. Scorpīi	5.8	3.60	12.3	23 28.1	10 6.8	+ 4 17.4	-0.3678	0.5689	0.0698	+ 2	-64		
41 G. Scorpīi	6.3	+3.65	-12.2	-24 12.8	12 13.3	+ 6 19.2	+0.2755	0.5703	-0.0648	+36	-25		
19 Scorpīi	4.9	3.70	11.5	23 58.4	15 6.6	+ 9 6.1	-0.1550	0.5721	0.0580	+11	-50		
ρ Ophiuchi	4.7	3.71	10.9	23 15.6	17 11.0	+11 5.9	-1.0182	0.5734	0.0530	-39	-90		
22 Scorpīi	4.8	3.79	11.1	24 56.2	19 4.9	-11 4.5	+0.6429	0.5745	0.0483	+59	- 4		
126 B. Scorpīi	6.1	3.85	9.9	24 18.6	23 47.8	- 6 32.2	-0.2123	0.5771	0.0366	+ 6	-54		
88 B. Ophiuchi	6.3	+4.00	- 8.6	-24 58.2	26 7 16.7	+ 0 39.7	+0.2708	0.5810	-0.0175	+31	-25		
26 Ophiuchi	5.8	4.00	8.5	24 51.9	7 21.4	+ 0 44.2	+0.1617	0.5810	0.0173	+25	-31		
137 B. Ophiuchi	6.3	4.09	7.5	25 9.3	12 14.1	+ 5 25.6	+0.4082	0.5833	-0.0045	+39	-17		
39 Ophiuchi	5.1	4.09	6.6	24 12.0	14 34.4	+ 7 40.5	-0.5842	0.5843	+0.0017	-16	-83		
θ Ophiuchi	3.4	4.14	6.5	24 55.2	16 9.8	+ 9 12.2	+0.1662	0.5849	0.0058	+24	-31		
191 B. Ophiuchi	6.3	+4.14	- 5.9	-24 10.2	17 24.8	+10 24.3	-0.5875	0.5854	+0.0003	-16	-85		

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

THE STAR'S					AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.		Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>
			$\Delta\alpha$	$\Delta\delta$		d h m	h m					
			s	"	s							
<i>b</i>	Ophiuchi	4.3	+4.14	-5.9	-24 6.1	26 17 55.3	+10 53.5	-0.6629	0.5856	+0.0106	-20	-90
136 G.	Ophiuchi	6.3	4.20	6.3	25 52.4	18 6.9	+11 4.7	+1.1654	0.5856	0.0111	+64	+37
51	Ophiuchi	4.8	4.16	5.2	23 54.1	19 56.3	-11 10.1	-0.8420	0.5863	0.0161	-30	-90
63	Ophiuchi	6.1	4.33	3.2	24 52.4	27 5 14.9	-21 3.5	+0.4235	0.5890	0.0413	+43	-16
4	Sagittarii	4.8	4.32	2.4	23 48.6	7 11.8	-0 21.2	-0.5774	0.5895	0.0466	-12	-82
7	Sagittarii	5.5	+4.36	-2.2	-24 17.0	8 23.8	+0 48.0	-0.0361	0.5897	+0.0498	+17	-43
9	Sagittarii	6.0	4.36	2.0	24 21.8	8 47.9	+1 11.0	+0.0667	0.5898	0.0509	+22	-37
1	Sagittarii	5.2	4.39	1.1	23 43.2	11 54.2	+4 10.1	-0.4193	0.5904	0.0594	-2	-68
70 B.	Sagittarii	6.4	4.48	-0.4	24 57.2	15 44.6	+7 51.3	+1.0839	0.5909	0.0698	+65	+28
24	Sagittarii	5.7	4.51	+1.2	24 5.7	20 37.1	-11 27.8	+0.5818	0.5912	0.0828	+57	-8
117 B.	Sagittarii	5.8	+4.51	+1.8	-23 34.6	22 26.5	-9 42.7	+0.2115	0.5914	+0.0877	+34	-29
26	Sagittarii	6.1	4.54	2.1	23 54.7	23 45.1	-8 27.3	+0.6672	0.5914	0.0912	+63	-3
28	Sagittarii	5.6	4.51	3.0	22 28.7	28 1 32.1	-6 44.5	-0.6133	0.5914	0.0959	-9	-86
30	Sagittarii	6.2	4.52	3.6	22 15.4	3 18.5	-5 2.4	-0.6625	0.5914	0.1006	-12	-90
$\nu^1$	Sagittarii	5.0	4.56	3.8	22 50.8	4 36.5	-3 47.4	+0.0658	0.5914	0.1040	+27	-37
$\nu^2$	Sagittarii	5.1	+4.56	+3.9	-22 46.5	4 58.7	-3 26.2	+0.0317	0.5913	+0.1050	+25	-39
154 B.	Sagittarii	5.9	4.58	3.8	23 16.8	5 19.6	-3 6.2	+0.5768	0.5913	0.1059	+58	-8
168 B.	Sagittarii	6.3	4.58	4.6	22 48.7	7 32.6	-0 58.4	+0.3465	0.5912	0.1116	+44	-21
<i>o</i>	Sagittarii	3.9	4.57	5.1	21 51.8	8 45.4	+0 11.5	-0.4711	0.5911	0.1147	0	-72
191 B.	Sagittarii	6.5	4.63	5.2	23 19.2	10 20.2	+1 42.6	+1.1788	0.5910	0.1188	+67	+37
$\pi$	Sagittarii	3.0	+4.56	+5.9	-21 9.3	10 46.2	+2 7.6	-0.9451	0.5909	+0.1199	-27	-90
199 B.	Sagittarii	6.4	4.59	6.0	21 47.7	11 49.5	+3 8.3	-0.1737	0.5908	0.1226	+16	-51
222 B.	Sagittarii	5.5	4.64	6.7	22 33.4	15 2.4	+6 13.7	+0.9951	0.5904	0.1306	+67	+19
50	Sagittarii	5.5	4.64	7.5	21 56.4	17 17.6	+8 23.5	+0.6776	0.5901	0.1361	+67	-3
253 B.	Sagittarii	6.1	4.64	8.1	21 29.0	19 6.9	+10 8.4	+0.4726	0.5897	0.1406	+54	-14
<i>f</i>	Sagittarii	5.1	+4.63	+10.1	-19 57.5	29 1 16.6	-7 56.3	-0.1375	0.5885	+0.1552	+21	-49
57	Sagittarii	6.0	4.63	10.9	19 15.2	3 36.4	-5 42.0	-0.4714	0.5879	0.1605	+5	-71
$\pi$	Capricorni	5.2	4.68	14.7	18 28.8	17 43.1	+7 51.8	+1.2407	0.5839	0.1903	+72	+39
31 B.	Capricorni	6.4	4.62	15.3	16 0.8	18 19.0	+8 26.4	-1.0832	0.5837	0.1915	-30	-90
$\rho$	Capricorni	5.0	4.67	14.9	18 5.1	18 20.8	+8 28.2	+0.9696	0.5837	0.1915	+72	+15
47 B.	Capricorni	6.2	+4.65	+15.8	-16 48.4	21 4.0	+11 5.1	+0.2359	0.5828	+0.1968	+46	-28
$\tau$	Capricorni	5.2	4.61	16.4	15 14.5	22 36.3	-11 26.2	-1.0028	0.5823	0.1996	-23	-90
61 B.	Capricorni	5.9	4.64	16.4	16 24.9	23 6.8	-10 56.9	+0.2558	0.5822	0.2006	+47	-27
95 B.	Capricorni	5.9	4.63	18.3	14 48.0	30 6 33.4	-3 47.3	+0.2056	0.5796	0.2134	+46	-29
53 B.	Aquarii	6.5	4.61	20.0	13 32.5	13 42.3	+3 5.5	+0.5352	0.5771	0.2244	+67	-12
18	Aquarii	5.5	+4.61	+20.7	-13 13.8	17 6.6	+6 22.1	+1.0009	0.5760	+0.2291	+77	+16
72 B.	Aquarii	6.5	4.58	21.2	11 55.3	18 48.4	-8 0.1	+0.1108	0.5754	0.2313	+43	-35
137 B.	Capricorni	6.2	4.56	22.1	10 56.7	23 31.0	-11 27.8	+0.2565	0.5739	0.2371	+52	-27
<i>c</i> <sup>1</sup>	Capricorni	5.3	4.54	22.6	9 27.5	31 1 51.2	-9 12.8	-0.6410	0.5732	0.2397	+4	-84
<i>c</i> <sup>2</sup>	Capricorni	6.3	4.54	22.7	9 39.2	2 23.1	-8 42.0	-0.3223	0.5730	0.2403	+21	-59
30	Aquarii	5.6	+4.50	+24.0	-6 55.0	9 35.2	-1 45.8	-1.2401	0.5708	+0.2473	-36	-90
44	Aquarii	5.7	4.48	24.9	5 47.7	15 28.8	+3 54.7	-0.8649	0.5691	0.2518	-7	-90
51	Aquarii	5.8	+4.47	+25.3	-5 15.0	18 28.4	+6 47.9	-0.6400	0.5683	+0.2537	+6	-84

SEPTEMBER.

$\kappa$	Aquarii	5.2	+4.45	+25.9	-4 39.0	1 0 19.7	-11 33.4	+0.2678	0.5669	+0.2567	+55	-26
207 B.	Aquarii	6.3	4.45	26.1	3 58.7	1 38.3	-10 17.7	-0.0506	0.5667	0.2573	+37	-43
6 G.	Piscium	6.2	4.42	26.8	2 50.0	9 10.4	-3 1.9	+0.7767	0.5653	0.2593	+87	+1
22 B.	Piscium	6.4	4.38	27.5	0 9.4	20 7.8	+7 32.1	+1.0047	0.5637	0.2593	+90	+15
<i>Pisium</i>		4.9	+4.37	+27.4	+0 48.5	21 36.6	+8 57.6	+0.4423	0.5636	+0.2590	+67	-17

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
		s	"	° ' "	d h m	h m				"	"
9 Piscium	6.4	+4.37	+27.5	+ 0 40.5	1 21 44.8	+ 9 5.6	+0.6098	0.5636	+0.2590	+81	- 8
16 Piscium	5.7	4.35	27.7	1 39.0	2 1 43.7	-11 3.9	+0.6840	0.5632	0.2580	+88	- 4
19 Piscium	5.4	4.34	27.6	3 2.0	6 4.8	- 6 52.1	+0.4444	0.5630	0.2563	+67	-17
36 Piscium	6.2	4.30	27.1	7 47.2	19 12.4	+ 5 47.5	-0.9197	0.5629	0.2482	-10	-82
d Piscium	5.4	4.30	27.1	7 44.2	20 57.5	+ 7 28.8	-0.4374	0.5630	0.2467	+17	-65
136 B. Piscium	6.5	+4.27	+26.6	+ 8 54.6	3 5 54.1	- 7 53.7	+0.5723	0.5636	+0.2381	+78	- 8
75 Piscium	6.3	4.26	25.4	12 31.1	16 51.0	+ 2 39.7	-0.4793	0.5647	0.2250	+15	-65
7 Piscium	3.7	4.24	24.0	14 55.5	4 3 33.2	-11 1.2	-0.5641	0.5661	0.2093	+10	-68
101 Piscium	6.2	4.22	24.0	14 14.7	5 23.8	- 9 14.6	+0.5030	0.5664	0.2064	+73	- 8
105 Piscium	6.1	4.24	23.4	15 59.5	7 3.2	- 7 38.8	-0.9144	0.5666	0.2037	-11	-74
3 Arietis	6.4	+4.24	+22.8	+17 0.2	10 0.0	- 4 48.5	-1.3429	0.5671	+0.1988	-59	-68
4 Arietis	5.8	4.23	22.8	16 33.0	10 41.0	- 4 8.8	-0.7493	0.5671	0.1976	-1	-74
1 Arietis	5.1	4.22	22.2	17 25.1	14 35.2	- 0 23.2	-0.8715	0.5677	0.1908	- 8	-73
35 B. Arietis	6.4	4.21	21.7	17 51.7	17 17.4	+ 2 13.1	-0.8111	0.5681	0.1858	- 5	-72
47 B. Arietis	6.5	4.20	21.5	17 38.4	19 0.9	+ 3 52.8	-0.2707	0.5684	0.1826	+26	-47
20 H <sup>1</sup> . Arietis	6.4	+4.19	+21.6	+16 50.5	19 42.2	+ 4 32.6	+0.6648	0.5685	+0.1813	+89	+ 3
26 Arietis	6.2	4.18	19.7	19 29.6	5 4 40.9	-10 48.3	-0.4822	0.5697	0.1637	+14	-58
$\mu$ Arietis	5.7	4.15	18.9	19 39.8	9 37.8	- 6 2.3	+0.1271	0.5703	0.1534	+48	-22
47 Arietis	5.8	4.13	17.7	20 20.5	16 13.8	+ 0 19.2	+0.3986	0.5709	0.1391	+66	- 7
e Arietis (mean)	4.6	4.13	17.4	21 0.8	16 42.3	+ 0 46.6	-0.2270	0.5710	0.1381	+28	-40
$\zeta$ Arietis	5.0	+4.08	+16.3	+20 44.5	23 17.7	+ 7 7.4	+0.9165	0.5714	+0.1233	+90	+25
r Arietis	5.2	4.06	15.9	20 51.2	6 1 56.7	+ 9 40.5	+1.1224	0.5716	0.1173	+90	+41
66 Arietis	6.1	4.08	14.8	22 31.4	4 57.0	-11 25.8	-0.2656	0.5716	0.1103	+26	-39
16 Tauri	5.4	4.06	13.0	24 2.0	11 47.2	- 4 50.8	-1.1406	0.5716	0.0941	+33	-66
17 Tauri	3.8	4.05	13.1	23 51.4	11 49.1	- 4 49.0	-0.9541	0.5716	0.0941	-17	-66
20 Tauri	4.1	+4.06	+12.9	+24 6.8	12 12.8	- 4 26.2	-1.1843	0.5716	+0.0931	-38	-66
23 Tauri	4.3	4.04	13.0	23 41.7	12 25.7	- 4 13.8	-0.7279	0.5715	0.0926	- 1	-66
7 Tauri	3.0	4.04	12.9	23 51.2	12 54.7	- 3 45.8	-0.8492	0.5715	0.0915	- 9	-66
104 B. Tauri	5.5	4.02	13.1	23 10.2	13 16.9	- 3 24.4	-0.1039	0.5715	0.0906	+35	-28
27 Tauri	3.7	4.04	12.8	23 48.2	13 36.9	- 3 5.2	-0.7349	0.5715	0.0898	- 2	-66
28 Tauri	5.2	+4.04	+12.8	+23 53.3	13 37.5	- 3 4.6	-0.8212	0.5715	+0.0898	- 7	-66
133 B. Tauri	5.9	3.99	13.3	21 59.8	13 57.4	- 2 45.4	+1.1828	0.5715	0.0890	+90	+49
32 Tauri	5.8	3.97	12.7	22 14.6	16 51.9	+ 0 2.7	+1.1754	0.5714	0.0820	+90	+49
33 Tauri	6.0	3.99	12.5	22 56.3	16 56.5	+ 0 7.1	+0.4540	0.5713	0.0818	+71	+ 2
161 B. Tauri	6.5	3.97	12.1	22 58.3	18 34.2	+ 1 41.2	+0.5508	0.5712	0.0778	+79	+ 8
36 Tauri	5.6	+3.98	+11.6	+23 52.9	19 59.4	+ 3 3.2	-0.2947	0.5711	+0.0744	+24	-38
62 Tauri	6.1	3.91	9.9	24 6.7	7 4 14.4	+11 0.0	-0.0061	0.5701	0.0543	+40	-20
284 B. Tauri	6.0	3.84	9.1	23 10.5	9 31.2	- 7 54.8	+1.2372	0.5692	0.0413	+82	+60
95 Tauri	6.2	3.83	8.4	23 56.1	12 21.8	- 5 10.5	+0.5419	0.5687	0.0344	+79	+11
300 B. Tauri	6.2	3.80	8.3	23 28.7	13 25.2	- 4 9.4	+1.0604	0.5684	0.0318	+90	+44
315 B. Tauri	6.3	+3.79	+ 7.1	+24 27.8	17 53.2	+ 0 8.8	+0.1360	0.5673	+0.0209	+49	- 9
99 Tauri	6.0	3.76	7.2	23 49.3	18 33.3	+ 0 47.5	+0.8308	0.5672	0.0193	+90	+29
k Tauri	5.6	3.79	6.7	24 55.5	18 41.1	+ 0 55.1	-0.3399	0.5672	0.0190	+21	-35
103 Tauri	5.5	3.72	6.2	24 9.5	22 56.7	+ 5 1.4	+0.5359	0.5660	+0.0087	+78	+13
118 Tauri	5.4	3.65	4.1	25 5.1	8 8 1.6	-10 13.4	-0.4751	0.5630	-0.0130	+13	-44
121 Tauri	5.1	+3.59	+ 4.0	+23 59.2	10 43.2	- 7 37.5	+0.6600	0.5620	-0.0194	+90	+19
132 Tauri	5.0	3.54	2.6	24 32.5	16 37.2	- 1 56.1	-0.0903	0.5597	0.0330	+35	-22
412 B. Tauri	5.8	3.49	2.1	24 14.4	20 6.1	+ 1 25.4	+0.1068	0.5582	0.0409	+47	-13
1 Geminorum	4.3	3.43	1.8	23 16.2	23 17.3	+ 4 29.9	+1.0128	0.5569	0.0481	+90	+39
3 Geminorum	5.6	3.40	1.4	23 7.7	9 1 46.7	+ 6 54.1	+1.0395	0.5557	0.0536	+90	+40
5 Geminorum	5.9	+3.42	+ 0.8	+24 26.4	2 33.5	+ 7 39.3	-0.4214	0.5553	-0.0553	+17	-44



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, $H$	$Y'$	$x'$	$y'$	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
6 Geminorum	6.3	+3.38	+ 1.3	+22 55.7	9 2 55.9	+ 8 1.0	+1.1932	0.5552	-0.0562	+90	+53
8 Geminorum	6.1	3.39	0.6	23 59.9	4 41.8	+ 9 43.2	-0.0666	0.5543	0.0600	+37	-24
9 Geminorum	6.2	3.38	0.6	23 46.2	4 59.7	+10 0.4	+0.1621	0.5542	0.0606	+50	-12
36 B. Geminorum	6.0	3.33	+ 0.1	23 22.5	8 50.7	-10 16.5	+0.3424	0.5523	0.0689	+62	- 3
d Geminorum	5.2	3.16	- 1.5	21 51.6	20 42.3	+ 1 11.0	+1.0311	0.5462	0.0932	+90	+35
87 B. Geminorum	5.8	+3.20	- 2.2	+23 42.0	20 52.9	+ 1 21.2	-0.9931	0.5461	-0.0936	-19	-66
44 Geminorum	5.9	3.11	2.8	22 45.7	10 3 3.9	+ 7 19.8	-0.5857	0.5428	0.1054	+ 8	-59
120 B. Geminorum	6.5	3.05	3.1	21 23.5	5 20.7	+ 9 32.2	+0.6679	0.5416	0.1097	+90	+10
8 Geminorum	3.5	3.02	3.8	22 8.1	10 2.4	- 9 55.4	-0.6817	0.5390	0.1183	+ 2	-67
56 Geminorum	5.2	2.98	3.4	20 36.0	10 55.9	+ 9 3.6	+0.8949	0.5386	0.1199	+90	+23
149 B. Geminorum	6.4	+2.96	- 4.1	+21 42.1	13 15.1	- 6 48.9	-0.5956	0.5373	-0.1239	+ 7	-62
61 Geminorum	5.8	2.95	3.7	20 25.4	13 18.3	- 6 45.8	+0.8004	0.5373	0.1241	+90	+17
63 Geminorum	5.3	2.97	4.2	21 36.9	13 40.2	- 6 24.7	-0.5529	0.5371	0.1247	+10	-59
79 Geminorum	6.3	2.86	5.1	20 30.9	22 4.2	+ 1 43.3	-0.4520	0.5325	0.1387	+16	-54
209 B. Geminorum	6.2	2.81	5.2	19 32.2	11 1 23.9	+ 4 56.6	+0.1537	0.5307	0.1440	+49	-21
85 Geminorum	5.2	+2.80	- 5.7	+20 6.1	3 12.6	+ 6 41.9	-0.7328	0.5298	-0.1468	- 1	-70
217 B. Geminorum	6.3	2.78	6.0	20 2.6	5 44.3	+ 9 8.9	-1.0440	0.5284	0.1507	-22	-70
10 H. Cancri	6.1	2.74	6.0	19 4.5	7 42.7	+11 3.7	-0.2776	0.5274	0.1536	+25	-45
5 Cancri (mean)	4.7	2.68	6.2	17 53.8	11 26.2	- 9 19.7	+0.4412	0.5254	0.1589	+69	- 8
d <sup>1</sup> Cancri	5.9	2.64	7.0	18 35.9	17 2.0	- 3 54.1	-1.2448	0.5226	0.1666	-41	-71
d <sup>2</sup> Cancri	6.2	+2.60	- 7.0	+17 19.1	18 18.5	- 2 40.0	-0.0440	0.5220	-0.1683	+38	-34
90 B. Cancri	6.3	2.54	7.1	15 36.0	23 33.9	+ 2 26.0	+0.9564	0.5194	0.1750	+90	+20
54 Cancri	6.3	2.47	7.9	15 39.4	7 14.8	+ 9 53.3	-0.4871	0.5160	0.1841	+14	-62
o <sup>1</sup> Cancri	5.1	2.45	8.3	15 38.4	10 28.8	-10 58.5	-1.0687	0.5146	0.1876	-22	-74
222 B. Cancri	6.3	2.32	8.6	11 50.8	21 23.3	- 0 22.9	+1.0330	0.5102	0.1985	+90	+22
5 Leonis	5.1	+2.26	- 9.4	+11 39.9	13 4 55.2	+ 6 56.1	-0.2848	0.5076	-0.2050	+25	-53
o Leonis	3.8	2.22	9.6	10 16.1	9 53.9	+11 46.3	+0.2382	0.5060	0.2088	+54	-25
83 B. Leonis	5.9	2.17	10.1	9 19.5	18 12.4	- 4 9.1	-0.4719	0.5037	0.2145	+16	-66
89 B. Leonis	6.2	2.16	10.1	8 42.5	19 8.0	- 3 15.1	+0.0145	0.5036	0.2151	+41	-38
$\pi$ Leonis	4.9	2.15	10.2	+ 8 26.4	20 16.7	- 2 8.3	+0.0656	0.5033	0.2158	+44	-35
NEW MOON.											
75 Virginis	5.6	+2.20	-14.6	-14 56.4	18 15 39.4	- 9 59.2	+0.6128	0.5222	-0.1911	+71	- 7
83 Virginis	5.6	2.25	14.6	15 46.0	21 30.2	- 4 19.1	+0.4162	0.5254	0.1845	+57	-18
35 Virginis	6.1	2.25	14.5	15 21.3	22 3.1	- 3 47.2	-0.1341	0.5257	0.1839	+27	-48
214 G. Virginis	6.5	+2.34	-14.2	-15 56.6	19 7 45.2	+ 5 37.1	-1.2165	0.5312	-0.1716	-42	-90
43 H. Virginis	5.5	2.41	14.4	17 49.1	12 41.0	+10 23.5	-0.0052	0.5341	0.1647	+31	-41
231 G. Virginis	6.4	2.42	14.4	18 12.2	13 28.8	+11 9.8	+0.2835	0.5346	0.1636	+47	-25
236 G. Virginis	5.7	2.42	14.5	18 20.1	14 14.4	+11 53.9	+0.3027	0.5350	0.1624	+48	-24
9 G. Libræ	6.5	2.53	14.4	20 4.8	21 57.1	- 4 38.2	+0.9840	0.5397	0.1507	+70	+17
17 G. Libræ	6.4	+2.60	-14.3	-20 49.7	20 3 16.3	+ 0 30.5	+1.0137	0.5430	-0.1420	+69	+20
18 G. Libræ	6.1	2.60	14.3	20 58.9	3 45.4	+ 0 58.7	+1.1099	0.5433	0.1411	+69	+28
43 B. Libræ	5.7	2.72	15.2	21 2.8	8 27.4	+ 5 31.3	+0.5344	0.5462	0.1330	+59	-11
44 G. Libræ	6.1	2.73	13.8	21 42.8	12 37.1	+ 9 32.7	+0.7141	0.5488	0.1255	+68	0
67 G. Libræ	5.8	2.79	13.4	22 5.8	17 7.9	-10 5.7	+0.5779	0.5515	0.1170	+60	- 8
169 B. Libræ	6.0	+2.94	-12.6	-22 52.2	21 2 42.2	- 0 51.2	+0.3761	0.5572	-0.0980	+45	-19
177 B. Libræ	6.2	2.95	12.5	22 53.0	3 23.5	- 0 11.2	+0.3225	0.5576	0.0965	+41	-22
42 Libræ	5.0	2.96	12.6	23 33.2	3 47.4	+ 0 11.9	+1.0005	0.5578	0.0957	+66	+20
31 B. Scorpii	5.4	3.06	12.1	24 17.4	9 45.4	+ 5 57.3	+1.2520	0.5612	0.0830	+66	+49
32 B. Scorpii	5.3	3.05	11.9	23 44.1	9 46.8	+ 5 58.6	+0.6577	0.5612	0.0829	+63	- 3
8 Scorpii	2.5	+3.07	-11.1	-22 23.4	12 35.1	+ 8 40.9	-1.0003	0.5627	-0.0768	-35	-90

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.						Limiting Parallels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y'</i>	<i>x'</i>	<i>y'</i>	N.	S.	
		$\Delta\alpha$	$\Delta\delta$									
		s	"	°	'	d	h	m	h	m		
50 B. Scorpii	6.4	+3.13	-11.6	-24 30.1	21	14	6.3	+10 8.8	+1.1347	0.5635	-0.0734	+66 +33
57 B. Scorpii	5.7	3.13	11.1	23 23.0		15	4.2	+11 4.7	-0.1251	0.5640	0.0713	+14 -48
24 G. Scorpii	6.2	3.16	11.3	24 14.6		15	49.0	+11 47.9	+0.7376	0.5644	0.0696	+66 +2
27 G. Scorpii	5.8	3.15	11.0	23 28.1		16	12.1	-11 49.8	-0.1150	0.5646	0.0687	+15 -47
41 G. Scorpii	6.3	3.19	10.9	24 12.8		18	21.1	-9 45.5	+0.5354	0.5657	0.0639	+52 -10
19 Scorpii	4.9	+3.23	-10.4	-23 58.4		21	18.0	-6 55.0	+0.1011	0.5672	-0.0570	+25 -35
$\rho$ Ophiuchi	4.7	3.25	9.8	23 15.5		23	25.2	-4 52.5	-0.7712	0.5682	0.0521	-22 -90
22 Scorpii	4.8	3.32	10.0	24 56.2	22	1	21.5	-3 0.4	+0.9085	0.5691	0.0475	+65 +14
126 B. Scorpii	6.1	3.38	9.0	24 18.6		6	11.1	+1 38.6	+0.0441	0.5712	0.0360	+20 -38
88 B. Ophiuchi	6.3	3.51	7.8	24 58.2		13	51.4	+9 1.9	+0.5331	0.5742	0.0172	+48 -10
26 Ophiuchi	5.8	+3.51	-7.8	-24 51.9		13	56.3	+9 6.6	+0.4225	0.5742	-0.0170	+41 -16
137 B. Ophiuchi	6.3	3.60	6.9	25 9.3		18	57.0	-10 4.0	+0.6719	0.5759	-0.0045	+59 -2
39 Ophiuchi	5.1	3.61	6.1	24 12.0		21	21.4	-7 45.0	-0.3342	0.5767	+0.0016	-3 -62
$\theta$ Ophiuchi	3.4	3.65	6.0	24 55.2		22	50.5	-6 10.6	+0.4260	0.5771	0.0058	+40 -16
191 B. Ophiuchi	6.3	3.65	5.4	24 10.2	23	0	16.7	-4 56.4	-0.3485	0.5774	0.0090	-3 -63
<i>b</i> Ophiuchi	4.3	+3.66	-5.4	-24 6.1		0	48.1	-4 26.2	-0.4149	0.5776	+0.0104	-7 -68
51 Ophiuchi	4.8	3.68	4.9	23 54.0		2	52.8	-2 26.1	-0.5973	0.5781	0.0157	-16 -85
63 Ophiuchi	6.1	3.86	3.1	24 52.4		12	29.0	+6 48.2	+0.6830	0.5800	0.0402	+62 -1
4 Sagittarii	4.8	3.85	2.3	23 48.6		14	29.8	+8 44.4	-0.3339	0.5803	0.0454	+1 -62
7 Sagittarii	5.5	3.89	2.2	24 17.0		15	44.2	+9 56.0	+0.2150	0.5804	0.0486	+31 -28
9 Sagittarii	6.0	+3.89	-2.0	-24 21.8		16	9.2	+10 20.1	+0.3192	0.5805	+0.0497	+37 -22
1 Sagittarii	5.2	3.92	-1.1	23 43.2		19	21.7	-10 34.8	-0.1760	0.5808	0.0578	+10 -51
24 Sagittarii	5.7	4.06	+0.8	24 5.7	24	4	22.8	-1 54.3	+0.8352	0.5811	0.0807	+66 +8
117 B. Sagittarii	5.8	4.07	1.5	23 34.6		6	16.2	-0 5.3	+0.4576	0.5811	0.0854	+49 -15
26 Sagittarii	6.1	4.10	1.7	23 54.7		7	37.6	+1 13.0	+0.9196	0.5811	0.0888	+66 +14
28 Sagittarii	5.6	+4.08	+2.6	-22 28.8		9	28.4	+2 59.6	-0.3829	0.5810	+0.0934	+3 -65
30 Sagittarii	6.2	4.09	3.1	22 15.4		11	18.6	+4 45.6	-0.4346	0.5809	0.0980	+1 -69
33 Sagittarii	5.8	4.08	3.7	21 27.7		12	36.5	+6 0.5	-1.1204	0.5808	0.1011	-42 -90
$\nu^1$ Sagittarii	5.0	4.13	3.2	22 50.8		12	39.4	+6 3.4	+0.3044	0.5809	0.1012	+41 -23
$\nu^2$ Sagittarii	5.1	4.14	3.4	22 46.5		13	2.5	+6 25.4	+0.2694	0.5808	0.1022	+39 -25
154 B. Sagittarii	5.9	+4.15	+3.3	-23 16.8		13	24.1	+6 46.2	+0.8231	0.5808	+0.1030	+67 +7
$\xi$ Sagittarii	3.7	4.10	4.2	21 12.9		14	7.9	+7 28.4	-1.2142	0.5808	0.1048	-52 -89
168 B. Sagittarii	6.3	4.17	4.0	22 48.7		15	42.0	+8 58.9	+0.5869	0.5806	0.1086	+59 -7
$\sigma$ Sagittarii	3.9	4.16	4.6	21 51.8		16	57.4	+10 11.4	-0.2452	0.5805	0.1117	+12 -55
$\pi$ Sagittarii	3.0	4.15	5.4	21 9.3		19	2.7	-11 48.1	-0.7291	0.5803	0.1167	-14 -90
199 B. Sagittarii	6.4	+4.19	+5.4	-21 47.7		20	8.3	-10 45.0	+0.0538	0.5802	+0.1193	+28 -37
222 B. Sagittarii	5.5	4.25	6.0	22 33.4		23	28.3	-7 32.5	+1.2384	0.5797	0.1271	+67 +44
50 Sagittarii	5.5	4.26	6.8	21 56.4	25	1	48.4	-5 17.8	+0.9130	0.5794	0.1324	+68 +13
253 B. Sagittarii	6.1	4.27	7.4	21 29.0		3	41.7	-3 28.8	+0.7026	0.5791	0.1368	+68 -1
<i>f</i> Sagittarii	5.1	4.28	9.4	19 57.5		10	4.9	+2 39.9	+0.0743	0.5779	0.1510	+32 -36
57 Sagittarii	6.0	+4.29	+10.2	-19 15.2		12	29.7	+4 59.3	-0.2681	0.5774	+0.1562	+15 -56
31 B. Capricorni	6.4	4.35	14.7	16 0.8	26	3	43.2	-4 21.4	-0.9124	0.5739	0.1865	-18 -90
$\rho$ Capricorni	5.0	4.40	14.1	18 5.1		3	45.2	-4 19.5	+1.1719	0.5739	0.1865	+72 +32
47 B. Capricorni	6.2	4.39	15.1	16 48.5		6	33.7	-1 37.2	+0.4221	0.5732	0.1916	+57 -18
$\tau$ Capricorni	5.2	4.36	15.9	15 14.5		8	9.1	-0 5.4	-0.8381	0.5729	0.1945	-12 -90
61 B. Capricorni	5.9	+4.39	+15.8	-16 24.9		8	40.5	+0 24.8	+0.4383	0.5727	+0.1954	+58 -17
95 B. Capricorni	5.9	4.42	17.8	14 48.0		16	21.2	+7 48.7	+0.3724	0.5708	0.2081	+56 -20
53 B. Aquarii	6.5	4.44	19.5	13 32.5		23	42.7	-9 6.0	+0.6910	0.5691	0.2190	+76 -3
18 Aquarii	5.5	4.46	20.3	13 13.8	27	3	12.7	-5 43.7	+1.1545	0.5683	0.2237	+77 +28
72 B. Aquarii	6.5	4.43	21.0	11 55.4		4	57.2	-4 3.0	+0.2492	0.5680	0.2260	+50 -27
137 B. Capricorni	6.2	+4.44	+22.0	-10 56.7		9	47.0	+0 36.3	+0.3853	0.5670	+0.2318	+59 -20

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.		
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle. <i>H</i>	<i>Y'</i>	<i>x'</i>	<i>y'</i>		N. S.	
		$\Delta\alpha$	$\Delta\delta$									
		<i>s</i>	<i>"</i>	<i>s</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i>	<i>m</i>	<i>s</i>	<i>"</i>	
<i>c</i> <sup>1</sup> Capricorni	5.3	+4.43	+22.8	9 27.5	27	12	10.6	+2 54.7	-0.5281	0.5665	+0.2345	+10 -74
<i>c</i> <sup>2</sup> Capricorni	6.3	4.43	22.8	9 39.2	12	43.2	+3 26.2	-0.2071	0.5664	0.2351	+27 -52	
30 Aquarii	5.6	4.43	24.5	6 55.0	20	4.7	+10 31.8	-1.1520	0.5652	0.2423	-29 -90	
44 Aquarii	5.7	4.44	25.6	5 47.7	28	2 4.9	-7 40.9	-0.7876	0.5644	0.2471	-3 -90	
51 Aquarii	5.8	4.45	26.0	5 15.0	5	7.6	-4 44.7	-0.5685	0.5641	0.2491	+10 -77	
$\kappa$ Aquarii	5.2	+4.46	+26.8	-4 38.9	11	4.0	+0 59.1	+0.3304	0.5636	+0.2524	+59 -23	
207 B. Aquarii	6.3	4.47	27.1	3 58.7	12	23.6	+2 15.8	+0.0060	0.5635	0.2530	+40 -40	
6 G. Piscium	6.2	4.49	27.9	2 49.9	20	0.5	+9 36.5	+0.8163	0.5632	0.2555	+87 +4	
22 B. Piscium	6.4	4.51	29.1	0 9.4	29	7 2.0	-3 45.4	+1.0117	0.5634	0.2563	+90 +16	
$\kappa$ Piscium	4.9	4.51	29.2	0 48.6	8	31.0	+2 19.7	+0.4433	0.5635	0.2561	+67 -17	
9 Piscium	6.4	+4.51	+29.2	+0 40.5	8	39.3	-2 11.7	+0.6109	0.5636	+0.2561	+80 -8	
16 Piscium	5.7	4.51	29.5	1 39.0	12	38.6	+1 39.2	+0.6732	0.5638	0.2554	+87 -5	
19 Piscium	5.4	4.52	29.7	3 2.1	16	59.4	+5 50.8	+0.4203	0.5643	0.2540	+65 -18	
36 Piscium	6.2	4.56	29.9	7 47.3	30	6 3.4	-5 33.4	-0.9791	0.5662	0.2468	-14 -82	
<i>d</i> Piscium	5.4	4.57	29.8	7 44.3	7	47.6	-3 52.9	-0.5025	0.5665	0.2455	+14 -69	
136 B. Piscium	6.5	+4.60	+29.4	+8 54.6	16	38.5	+4 38.8	+0.4795	0.5683	+0.2375	+70 -13	

OCTOBER.

75 Piscium	6.3	+4.66	+28.7	+12 31.2	1 3 25.8	-8 57.3	-0.5943	0.5708	+0.2248	+8 -72
$\eta$ Piscium	3.7	+4.71	+27.4	+14 55.6	13 56.1	+1 9.9	-0.7028	0.5735	+0.2097	+2 -75
101 Piscium	6.2	4.70	27.3	14 14.7	15 44.4	+2 54.2	+0.3511	0.5739	0.2068	+61 -16
105 Piscium	6.1	4.73	26.9	15 59.6	17 21.8	+4 27.9	-1.0577	0.5743	0.2042	-21 -74
4 Arietis	5.8	4.74	26.3	16 33.0	20 54.8	+7 53.0	-0.9016	0.5752	0.1982	-10 -73
$\epsilon$ Arietis	5.1	4.76	25.7	17 25.2	2 043.6	+11 33.3	-1.0304	0.5761	0.1914	-20 -73
35 B. Arietis	6.4	+4.76	+25.2	+17 51.7	3 21.9	-9 54.2	-0.9757	0.5767	+0.1865	-16 -72
47 B. Arietis	6.5	4.76	25.0	17 38.5	5 2.9	-8 17.1	-0.4442	0.5771	0.1833	+16 -57
20 H <sup>1</sup> Arietis	6.4	4.75	24.9	16 50.5	5 43.2	-7 38.3	+0.4802	0.5772	0.1820	+71 -7
26 Arietis	6.2	4.80	23.1	19 29.6	14 28.2	+0 47.0	-0.6711	0.5790	0.1644	+3 -69
$\mu$ Arietis	5.7	4.79	22.2	19 39.9	19 17.2	+5 25.1	-0.0774	0.5798	0.1542	+36 -33
47 Arietis	5.8	+4.81	+20.8	+20 20.6	3 142.4	+11 35.8	+0.1800	0.5807	+0.1398	+51 -18
$\epsilon$ Arietis (mean)	4.6	4.81	20.6	21 0.9	2 10.1	-11 57.5	-0.4385	0.5807	0.1388	+16 -52
$\zeta$ Arietis	5.0	4.78	19.3	20 44.6	8 34.5	-5 47.8	+0.6806	0.5813	0.1239	+90 +10
$\tau$ Arietis	5.2	4.78	18.7	20 51.2	11 9.0	+3 19.2	+0.8800	0.5814	0.1178	+90 +23
66 Arietis	6.1	4.82	17.6	22 31.4	14 4.3	-0 30.6	-0.4939	0.5814	0.1108	+13 -53
17 Tauri	3.8	+4.83	+15.8	+23 51.5	20 44.6	+5 54.5	-1.1818	0.5814	+0.0944	-38 -66
23 Tauri	4.3	4.82	15.6	23 41.7	21 20.2	+6 28.7	-0.9594	0.5813	0.0930	-17 -66
$\eta$ Tauri	3.0	4.82	15.5	23 51.2	21 48.4	+6 55.9	-1.0796	0.5813	0.0918	-27 -66
104 B. Tauri	5.5	4.80	15.6	23 10.3	22 10.0	+7 16.6	-0.3447	0.5813	0.0909	+21 -42
27 Tauri	3.7	4.82	15.3	23 48.3	22 29.4	+7 35.3	-0.9676	0.5813	0.0901	-18 -66
28 Tauri	5.2	+4.82	+15.3	+23 53.3	22 30.0	+7 35.9	-1.0528	0.5813	+0.0901	-25 -66
133 B. Tauri	5.9	4.76	15.8	21 59.8	22 49.3	+7 54.4	+0.9241	0.5813	0.0893	+90 +29
32 Tauri	5.8	4.76	15.0	22 14.6	4 138.9	+10 37.6	+0.9134	0.5810	0.0822	+90 +29
33 Tauri	6.0	4.78	14.8	22 56.4	1 43.4	+10 41.8	+0.2015	0.5810	0.0820	+52 -11
161 B. Tauri	6.5	4.77	14.4	22 58.3	3 18.4	-11 46.8	+0.2953	0.5808	0.0780	+59 -6
36 Tauri	5.6	+4.79	+13.8	+23 52.9	4 41.1	-10 27.2	-0.5405	0.5807	+0.0746	+10 -53
62 Tauri	6.1	4.74	11.8	24 6.7	12 42.5	-2 44.1	-0.2638	0.5794	0.0543	+25 -34
72 Tauri	5.4	4.69	11.9	22 48.8	14 4.7	-1 25.0	+1.1591	0.5790	0.0508	+90 +51
284 B. Tauri	6.0	4.68	10.8	23 10.5	17 50.7	+2 12.4	+0.9585	0.5782	0.0412	+90 +35
95 Tauri	6.2	4.68	9.9	23 56.1	20 36.9	+4 52.4	+0.2701	0.5774	0.0342	+57 -3
Tauri	6.2	+4.65	+9.8	+23 28.8	21 38.7	+5 51.9	+0.7810	0.5771	+0.0316	+90 +25

## ELEMENTS FOR THE PREDICTION OF ECLIPSATIONS.

OCTOBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limit- ing Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
315 B. Tauri	6.3	+4.65	+ 8.3	+24 27.8	d 5 1 59.8	+10 3.2	-0.1345	0.5758	+0.0206	+32	-24
99 Tauri	6.0	4.62	8.4	23 49.3	2 38.9	+10 40.9	+0.5508	0.5756	0.0190	+79	+13
k Tauri	5.6	4.66	8.0	24 55.5	2 46.4	+10 48.1	-0.6049	0.5755	0.0187	+ 6	-54
103 Tauri	5.5	4.59	7.2	24 9.5	6 55.7	- 9 11.9	+0.2570	0.5740	+0.0083	+56	- 2
118 Tauri	5.4	4.54	4.6	25 5.1	15 47.8	- 0 39.4	-0.7465	0.5703	-0.0135	- 3	-65
121 Tauri	5.1	+4.48	+ 4.4	+23 59.2	18 25.7	+ 1 52.6	+0.3738	0.5691	-0.0198	+64	+ 3
394 B. Tauri	6.0	4.41	3.8	23 10.0	21 47.5	+ 5 7.1	+1.1655	0.5674	0.0279	+90	+53
132 Tauri	5.0	4.43	2.8	24 32.5	6 0 12.2	+ 7 26.5	-0.3701	0.5663	0.0335	+19	-39
412 B. Tauri	5.8	4.38	2.0	24 14.4	3 36.8	+10 43.7	-0.1763	0.5645	0.0415	+30	-28
1 Geminorum	4.3	4.31	1.6	23 16.2	6 44.2	-10 15.5	+0.7190	0.5628	0.0486	+90	+19
3 Geminorum	5.6	+4.28	+ 1.1	+23 7.7	9 10.8	- 7 54.2	+0.7451	0.5614	-0.0541	+90	+21
5 Geminorum	5.9	4.32	0.4	24 26.4	9 56.7	- 7 9.9	-0.7005	0.5610	0.0558	0	-64
6 Geminorum	6.3	4.26	0.9	22 55.7	10 18.7	- 6 48.7	+0.8970	0.5608	0.0566	+90	+30
7 Gemin. (var.)	3.2	4.23	0.8	22 31.9	11 26.4	- 5 43.3	+1.2570	0.5601	0.0591	+79	+62
8 Geminorum	6.1	4.27	0.1	23 59.9	12 2.7	- 5 8.3	-0.3498	0.5597	0.0604	+20	-40
9 Geminorum	6.2	+4.26	+ 0.1	+23 46.2	12 20.3	- 4 51.4	-0.1236	0.5595	-0.0611	+33	-27
$\mu$ Geminorum	3.2	4.19	- 0.1	22 33.4	14 59.2	- 2 18.0	+1.0088	0.5580	0.0669	+90	+37
36 B. Geminorum	6.0	4.20	0.6	23 22.4	16 7.2	- 1 12.5	+0.0546	0.5574	0.0693	+43	-18
d Geminorum	5.2	4.01	2.7	21 51.6	7 3 47.8	+10 4.0	+0.7376	0.5501	0.0935	+90	+16
87 B. Geminorum	5.8	4.07	3.4	23 42.0	3 58.3	+10 14.2	-1.2687	0.5500	0.0938	-53	-66
44 Geminorum	5.9	+3.96	- 4.3	+22 45.7	10 4.3	- 7 52.2	-0.8642	0.5462	-0.1055	-10	-67
120 B. Geminorum	6.5	3.89	4.6	21 23.5	12 19.4	- 5 41.7	+0.3798	0.5447	0.1098	+64	- 5
$\delta$ Geminorum	3.5	3.86	5.5	22 8.1	16 58.0	- 1 12.2	-0.9580	0.5418	0.1182	-16	-68
56 Geminorum	5.2	3.80	5.1	20 36.0	17 50.9	- 0 21.1	+0.6072	0.5412	0.1198	+84	+ 6
149 B. Geminorum	6.4	3.79	6.0	21 42.1	20 8.6	+ 1 52.2	-0.8714	0.5398	0.1238	-10	-69
61 Geminorum	5.8	+3.77	- 5.5	+20 25.4	20 11.9	+ 1 55.3	+0.5145	0.5397	-0.1239	+75	0
63 Geminorum	5.3	3.79	6.1	21 36.9	20 33.6	+ 2 16.3	-0.8289	0.5395	0.1245	- 7	-68
79 Geminorum	6.3	3.66	7.2	20 30.9	8 4 53.0	+10 19.7	-0.7250	0.5343	0.1383	0	-69
y Geminorum	5.0	3.61	6.6	18 42.7	5 23.0	+10 48.7	+1.1771	0.5339	0.1391	+90	+43
209 B. Geminorum	6.2	3.59	7.4	19 32.2	8 11.2	-10 28.5	-0.1211	0.5322	0.1435	+33	-36
85 Geminorum	5.2	+3.58	- 7.9	+20 6.1	9 59.2	- 8 43.9	-1.0012	0.5311	-0.1462	-19	-70
217 B. Geminorum	6.3	3.55	8.3	20 2.5	12 29.8	- 6 17.9	-1.3090	0.5296	0.1500	-55	-69
10 H. Cancri	6.1	3.50	8.3	19 4.5	14 27.5	- 4 23.9	-0.5455	0.5284	0.1528	+10	-62
$\zeta$ Cancri (mean)	4.7	3.44	8.6	17 53.8	18 9.6	- 0 48.7	+0.1724	0.5263	0.1581	+50	-22
d <sup>2</sup> Cancri	6.2	3.33	9.5	17 19.1	9 1 0.0	+ 5 49.1	-0.3041	0.5225	0.1672	+24	-49
90 B. Cancri	6.3	+3.24	- 9.6	+15 35.9	6 14.2	+10 53.9	+0.6975	0.5196	-0.1737	+90	+ 4
54 Cancri	6.3	3.15	10.6	15 39.4	13 53.9	- 5 40.2	-0.7314	0.5158	0.1825	0	-74
o <sup>1</sup> Cancri	5.1	3.12	11.0	15 38.3	17 7.4	- 2 32.4	-1.3069	0.5143	0.1860	-48	-74
222 B. Cancri	6.3	2.95	11.2	11 50.8	10 4 1.1	+ 8 2.5	+0.8034	0.5096	0.1966	+90	+ 7
$\epsilon$ Leonis	5.1	2.86	12.1	11 39.9	11 32.6	- 8 38.9	-0.4988	0.5069	0.2029	+14	-66
h Leonis	5.2	+2.84	-11.6	+10 4.8	11 33.8	- 8 37.8	+1.2546	0.5069	-0.2029	+90	+41
o Leonis	3.8	2.79	12.2	10 16.0	16 31.2	- 3 48.8	+0.0315	0.5054	0.2067	+42	-36
83 B. Leonis	5.9	2.71	12.7	9 19.4	11 0 49.5	+ 4 15.5	-0.6622	0.5031	0.2122	+ 5	-79
89 B. Leonis	6.2	2.70	12.6	8 42.4	1 45.1	+ 5 9.6	-0.1749	0.5029	0.2128	+31	-48
$\pi$ Leonis	4.9	2.68	12.6	8 26.4	2 53.8	+ 6 16.3	-0.1217	0.5027	0.2135	+34	-45
43 Leonis	6.3	+2.57	-13.4	+ 6 57.6	15 26.1	- 5 32.1	-1.1991	0.5005	-0.2198	-31	-83
155 B. Leonis	6.5	2.55	13.1	6 6.7	15 35.0	- 5 23.4	-0.2893	0.5005	0.2199	-25	-56
237 B. Leonis	6.3	2.41	13.2	1 27.7	12 7 39.1	+10 14.4	+1.2931	0.4995	0.2249	+90	+41
55 Leonis	6.1	2.40	13.3	1 10.6	9 34.6	-11 53.3	+1.1761	0.4995	0.2253	+90	+29
$\rho^3$ Leonis	6.1	2.36	13.4	0 26.6	13 58.3	- 7 36.8	+0.9969	0.4997	0.2260	+90	+15
p <sup>5</sup> Leonis	5.3	+2.34	-13.7	+ 0 22.7	19 35.8	- 2 8.6	-0.2052	0.5001	-0.2265	+29	-50

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
		s	"	° ' "	d h m	h m				°	' "
368 B. Leonis	6.3	+2.29	-13.7	-1 14.8	13 3 25.2	+ 5 28.0	-0.1774	0.5011	-0.2265	+31	-50
e Leonis	5.1	2.28	13.6	2 32.9	4 45.3	+ 6 45.9	+0.9614	0.5013	0.2264	+87	+13
431 B. Leonis	6.2	2.27	13.8	1 58.8	9 12.5	+11 5.7	-0.6749	0.5021	0.2259	+ 4	-87
NEW MOON.											
47 G. Libræ	6.1	+2.53	-12.0	-21 42.8	17 18 8.8	- 7 8.2	+0.8902	0.5529	-0.1245	+68	+12
64 G. Libræ	5.8	2.57	11.7	22 5.8	22 37.4	- 2 48.8	+0.7620	0.5555	0.1160	+68	+ 3
169 B. Libræ	6.0	2.67	10.9	22 52.2	18 8 7.7	+ 6 21.6	+0.5760	0.5608	0.0968	+58	- 8
177 B. Libræ	6.2	2.68	10.8	22 53.0	8 48.7	+ 7 1.2	+0.5235	0.5612	0.0954	+54	-11
422 Libræ	5.0	2.69	10.9	23 33.1	9 12.5	+ 7 24.2	+1.2015	0.5613	0.0946	+66	+40
32 B. Scorpïi	5.3	+2.75	-10.3	-23 44.1	15 10.0	-10 50.9	+0.8680	0.5643	-0.0818	+66	+10
δ Scorpïi	2.5	2.76	9.6	22 23.3	17 57.6	- 8 9.3	-0.7859	0.5656	0.0756	-21	-90
57 B. Scorpïi	5.7	2.81	9.5	23 23.0	20 26.2	- 5 46.0	+0.0926	0.5668	0.0701	+26	-35
24 G. Scorpïi	6.2	2.83	9.6	24 14.6	21 10.9	- 5 2.9	+0.9565	0.5671	0.0685	+66	+18
27 G. Scorpïi	5.8	2.82	9.4	23 28.0	21 33.9	- 4 40.8	+0.1043	0.5673	0.0675	+26	-34
41 G. Scorpïi	6.3	+2.86	- 9.3	-24 12.8	23 42.6	- 2 36.7	+0.7577	0.5682	-0.0626	+66	+ 4
19 Scorpïi	4.9	2.89	8.8	23 58.4	19 2 39.2	+ 0 13.5	+0.3269	0.5694	0.0559	+38	-22
ρ Ophiuchi	4.7	2.90	8.4	23 15.5	4 46.2	+ 2 15.9	-0.5438	0.5702	0.0509	-10	-78
22 Scorpïi	4.8	2.95	8.5	24 56.1	6 42.5	+ 4 8.0	+1.1404	0.5710	0.0464	+65	+35
VENUS	-3.7	...	...	24 3.0	7 57.1	+ 5 19.9	+0.1454	0.5227	0.0335	+26	-32
126 B. Scorpïi	6.1	+2.99	- 7.6	-24 18.6	11 32.3	+ 8 47.2	+0.2802	0.5726	-0.0348	+33	-24
24 Ophiuchi	5.5	3.05	6.3	23 1.3	17 56.3	- 9 3.0	-1.2538	0.5745	0.0193	-64	-78
88 B. Ophiuchi	6.3	3.10	6.6	24 58.1	19 13.8	- 7 48.3	+0.7788	0.5748	0.0161	+65	+ 5
26 Ophiuchi	5.8	3.11	6.6	24 61.9	19 18.7	- 7 43.6	+0.6680	0.5748	0.0159	+59	- 2
137 B. Ophiuchi	6.3	3.18	5.8	25 9.3	20 0 20.8	- 2 52.8	+0.9234	0.5759	-0.0034	+65	+15
39 Ophiuchi	5.1	+3.18	- 5.1	-24 11.9	2 46.1	- 0 32.9	-0.0845	0.5764	+0.0026	+10	-45
θ Ophiuchi	3.4	3.22	5.0	24 55.2	4 25.0	+ 1 2.2	+0.6805	0.5767	0.0067	+60	- 1
191 B. Ophiuchi	6.3	3.22	4.5	24 10.2	5 42.7	+ 2 17.0	-0.0965	0.5768	0.0099	+10	-46
b Ophiuchi	4.3	3.22	4.5	24 6.1	6 14.3	+ 2 47.4	-0.1628	0.5769	0.0112	+ 7	-50
51 Ophiuchi	4.8	3.24	4.0	23 54.0	8 20.0	+ 4 48.6	-0.3445	0.5772	0.0165	- 2	-62
63 Ophiuchi	6.1	+3.39	- 2.5	-24 52.3	18 2.2	- 9 51.0	+0.9502	0.5778	+0.0408	+65	+17
4 Sagittarii	4.8	3.39	1.8	23 48.6	20 4.5	- 7 53.5	-0.0722	0.5779	0.0458	+15	-44
21 G. Sagittarii	5.7	3.37	1.2	22 46.8	20 57.9	- 7 2.1	-1.1065	0.5780	0.0480	-46	-90
7 Sagittarii	5.5	3.42	1.6	24 17.0	21 19.9	- 6 40.9	+0.4812	0.5779	0.0490	+47	-13
9 Sagittarii	6.0	3.43	1.6	24 21.8	21 45.2	- 6 16.5	+0.5864	0.5778	0.0500	+55	- 7
1 Sagittarii	5.2	+3.45	- 0.7	-23 43.2	21 1 0.5	- 3 8.6	+0.0894	0.5778	+0.0580	+25	-35
24 Sagittarii	5.7	3.57	+ 1.0	24 5.7	10 10.6	+ 5 40.8	+1.1135	0.5770	0.0804	+66	+31
117 B. Sagittarii	5.8	3.58	1.6	23 34.6	12 6.0	+ 7 31.9	+0.7333	0.5767	0.0851	+66	+ 2
26 Sagittarii	6.1	3.61	1.7	23 54.7	13 29.0	+ 8 51.7	+1.2002	0.5765	0.0883	+66	+41
28 Sagittarii	5.6	3.59	2.6	22 28.8	15 22.0	+10 40.5	-0.1143	0.5762	0.0928	+17	-47
30 Sagittarii	6.2	+3.61	+ 3.1	-22 15.4	17 14.5	-11 31.2	-0.1661	0.5759	+0.0972	+15	-50
33 Sagittarii	5.8	3.60	3.6	21 27.7	18 34.0	-10 14.6	-0.8557	0.5757	0.1003	-23	-90
γ <sup>1</sup> Sagittarii	5.0	3.64	3.2	22 50.8	18 37.0	-10 11.7	+0.5807	0.5757	0.1005	+58	- 7
γ <sup>2</sup> Sagittarii	5.1	3.65	3.3	22 46.5	19 0.5	- 9 49.2	+0.5454	0.5756	0.1014	+56	-10
154 B. Sagittarii	5.9	3.66	3.2	23 16.8	19 22.6	- 9 27.8	+1.1050	0.5755	0.1022	+67	+29
ε Sagittarii	3.7	+3.62	+ 4.0	-21 12.9	20 7.4	- 8 44.7	-0.9534	0.5754	+0.1040	-29	-90
168 B. Sagittarii	6.3	3.68	3.9	22 48.7	21 43.6	- 7 12.1	+0.8669	0.5751	0.1076	+67	+10
o Sagittarii	3.9	3.67	4.4	21 51.8	23 0.7	- 5 57.9	+0.0261	0.5748	0.1106	+26	-39
π Sagittarii	3.0	3.67	5.1	21 9.3	22 1 8.9	- 3 54.4	-0.4631	0.5743	0.1154	+1	-71
199 B. Sagittarii	6.4	3.70	5.1	21 47.7	2 16.1	- 2 49.7	+0.3286	0.5741	0.1179	+44	-22
50 Sagittarii	5.5	+3.78	+ 6.3	-21 56.4	8 4.7	+ 2 46.0	+1.1983	0.5726	+0.1307	+68	+38



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y'	x'	y'	N.	S.
		Δα	Δδ		d h m	h m					
253 B. Sagittarii	6.1	+3.79	+ 6.9	-21 29.0	22 10 0.9	+ 4 37.9	+0.9853	0.5722	+0.1349	+69	+18
266 B. Sagittarii	6.1	3.75	8.2	19 2.1	12 23.0	+ 6 54.7	-1.2067	0.5715	0.1399	-47	-90
f Sagittarii	5.1	3.81	8.7	19 57.5	16 34.6	+10 57.2	+0.3481	0.5703	0.1486	+48	-21
57 Sagittarii	6.0	3.83	9.5	19 15.2	19 3.6	-10 39.2	+0.0003	0.5696	0.1536	+29	-40
31 B. Capricorni	6.4	3.91	13.9	16 0.8	23 10 45.6	+ 4 28.6	-0.6621	0.5648	0.1827	- 3	-88
27 G. Capricorni	6.2	+3.90	+14.2	-15 19.9	11 47.0	+ 5 27.7	-1.1682	0.5645	+0.1844	-37	-90
47 B. Capricorni	6.2	3.97	14.1	16 48.5	13 41.8	+ 7 18.5	+0.6905	0.5640	0.1876	+73	- 2
r Capricorni	5.2	3.94	15.0	15 14.5	15 20.3	+ 8 53.4	-0.5905	0.5635	0.1903	+ 2	-80
61 B. Capricorni	5.9	3.97	14.8	16 25.0	15 52.8	+ 9 24.8	+0.7054	0.5634	0.1913	+74	- 1
95 B. Capricorni	5.9	4.01	16.7	14 48.0	23 49.4	- 6 55.6	+0.6313	0.5611	0.2034	+72	- 6
53 B. Aquarii	6.5	+4.06	+18.4	-13 32.5	24 7 26.4	+ 0 25.4	+0.9465	0.5592	+0.2138	+76	+13
72 B. Aquarii	6.5	4.08	19.9	11 55.4	12 52.1	+ 5 39.7	+0.4904	0.5579	0.2205	+65	-14
137 B. Capricorni	6.2	4.11	21.0	10 56.7	17 52.3	+10 29.4	+0.6215	0.5569	0.2261	+75	- 7
c <sup>1</sup> Capricorni	5.3	4.10	21.9	9 27.5	20 21.0	-11 7.0	-0.3110	0.5565	0.2287	+21	-58
c <sup>2</sup> Capricorni	6.3	4.11	21.9	9 39.2	20 54.8	-10 34.4	+0.0145	0.5564	0.2292	+38	-39
30 Aquarii	5.6	+4.14	+23.8	- 6 55.0	25 4 31.9	- 3 13.2	-0.9590	0.5553	+0.2361	-14	-90
44 Aquarii	5.7	4.18	24.9	5 47.7	10 44.8	+ 2 47.0	-0.6002	0.5546	0.2408	+ 7	-80
51 Aquarii	5.8	4.20	25.4	5 15.0	13 53.7	+ 5 49.3	-0.3836	0.5545	0.2428	+19	-63
κ Aquarii	5.2	4.24	26.2	4 39.0	20 2.2	+11 45.2	+0.5169	0.5543	0.2461	+71	-13
207 B. Aquarii	6.3	4.25	26.6	3 58.7	21 24.4	-10 55.5	+0.1844	0.5543	0.2467	+50	-30
6 G. Piscium	6.2	+4.31	+27.5	- 2 49.9	26 5 15.9	- 3 20.1	+0.9890	0.5545	+0.2493	+87	+15
3 Piscium	6.3	4.30	28.4	0 15.1	6 20.4	- 2 17.8	-1.3165	0.5546	0.2495	-44	-88
22 B. Piscium	6.4	4.39	29.0	- 0 9.4	16 36.9	+ 7 37.5	+1.1582	0.5557	0.2503	+90	+27
κ Piscium	4.9	4.40	29.2	+ 0 48.6	18 8.3	+ 9 5.7	+0.5780	0.5560	0.2502	+77	-10
9 Piscium	6.4	4.39	29.2	0 40.5	18 16.9	+ 9 14.0	+0.7474	0.5560	0.2501	+90	0
16 Piscium	5.7	+4.42	+29.7	+ 1 39.0	22 22.5	-10 48.8	+0.7995	0.5567	+0.2495	+90	+ 3
19 Piscium	5.4	4.46	30.0	3 2.1	27 25.0	- 6 30.6	+0.5312	0.5576	0.2484	+74	-12
36 Piscium	6.2	4.58	30.9	7 47.3	16 11.0	+ 6 22.4	-0.9199	0.5611	0.2418	+10	-82
d Piscium	5.4	4.59	30.9	7 44.3	17 57.2	+ 8 4.8	-0.4432	0.5617	0.2406	+17	-65
136 B. Piscium	6.5	4.67	30.6	8 54.6	28 257.0	- 7 14.5	+0.5226	0.5647	0.2332	+73	-10
75 Piscium	6.3	+4.80	+30.4	+12 31.2	13 52.2	+ 3 17.2	-0.5894	0.5687	+0.2212	+ 8	-72
η Piscium	3.7	4.92	29.4	14 55.6	29 0 27.2	-10 30.8	-0.7261	0.5728	0.2067	+ 1	-75
101 Piscium	6.2	4.92	29.1	14 14.7	2 16.1	- 8 45.9	+0.3272	0.5736	0.2040	+60	-17
105 Piscium	6.1	4.97	29.0	15 59.6	3 53.8	- 7 11.9	-1.0909	0.5742	0.2014	-24	-74
4 Arietis	5.8	5.00	28.5	16 33.0	7 27.5	- 3 46.1	-0.9431	0.5756	0.1956	-13	-73
ι Arietis	5.1	+5.05	+27.9	+17 25.2	11 16.6	- 0 5.4	-1.0815	0.5771	+0.1890	-24	-73
35 B. Arietis	6.4	5.07	27.5	17 51.8	13 55.0	+ 2 27.0	-1.0331	0.5780	0.1843	-20	-72
47 B. Arietis	6.5	5.08	27.2	17 38.5	15 35.8	+ 4 4.1	-0.5050	0.5786	0.1812	+13	-61
20 H <sup>1</sup> . Arietis	6.4	5.08	27.0	16 50.6	16 16.0	+ 4 42.9	+0.4186	0.5789	0.1799	+66	-10
26 Arietis	6.2	5.19	25.4	19 29.7	30 0 59.3	-10 53.7	-0.7545	0.5818	0.1627	- 2	-71
μ Arietis	5.7	+5.22	+24.4	+19 39.9	5 46.5	- 6 17.5	-0.1727	0.5832	+0.1526	+30	-38
47 Arietis	5.8	5.28	22.9	20 20.6	12 8.6	- 0 9.9	+0.0692	0.5849	0.1385	+44	-23
ε Arietis (mean)	4.6	5.28	22.8	21 0.9	12 36.1	+ 0 16.5	-0.5487	0.5850	0.1375	+10	-59
ζ Arietis	5.0	5.30	21.2	20 44.6	18 56.4	+ 6 22.2	+0.5524	0.5862	0.1227	+78	+ 3
τ Arietis	5.2	5.31	20.6	20 51.3	21 29.1	+ 8 49.0	+0.7451	0.5866	0.1167	+90	+15
63 Arietis	5.2	+5.30	+20.5	+20 27.1	22 6.4	+ 9 24.8	+1.2270	0.5867	+0.1152	+88	+52
65 Arietis	6.0	5.30	20.4	20 30.9	22 46.8	+10 3.7	+1.2398	0.5868	0.1135	+86	+54
66 Arietis	6.1	5.37	19.7	22 31.5	31 0 22.1	+11 35.4	-0.6288	0.5870	0.1097	+ 4	-62
23 Tauri	4.3	5.42	17.6	23 41.7	7 31.9	- 5 31.5	-1.1058	0.5875	0.0919	-30	-66
η Tauri	3.0	5.43	17.5	23 51.3	7 59.6	- 5 4.8	-1.2262	0.5875	0.0907	-45	-66
104 B. Tauri	5.5	+5.41	+17.5	+23 10.3	8 20.9	- 4 44.3	-0.4962	0.5875	+0.0899	+12	-52

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.			
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y</i>	<i>x'</i>	<i>y'</i>	N.	S.		
		$\Delta\alpha$	$\Delta\delta$										
		<i>s</i>	<i>"</i>	<i>"</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i>	<i>m</i>		<i>"</i>	<i>"</i>	
27 Tauri	3.7	+5.43	+17.3	+23 48.3	31	8	40.0	- 4	26.0	-1.1161	0.5876	+0.0891	-31 -66
28 Tauri	5.2	5.43	17.3	23 53.3		8	40.5	- 4	25.5	-1.2008	0.5875	0.0890	-41 -66
133 B. Tauri	5.9	5.37	17.4	21 59.8		8	59.6	- 4	7.1	+0.7636	0.5876	0.0882	+90 +19
32 Tauri	5.8	5.38	16.6	22 14.7		11	46.4	- 1	26.8	+0.7472	0.5875	0.0812	+90 +18
33 Tauri	6.0	5.40	16.6	22 56.4		11	50.8	- 1	22.6	+0.0398	0.5875	0.0810	+42 -20
161 B. Tauri	6.5	+5.40	+16.1	+22 58.3		13	24.3	+ 0	7.3	+0.1299	0.5875	+0.0770	+48 -14
36 Tauri	5.6	5.44	15.6	23 53.0		14	45.7	+ 1	25.5	-0.7029	0.5874	0.0735	0 -65
192 B. Tauri	6.1	5.37	14.8	22 12.3		18	11.4	+ 4	43.3	+1.2595	0.5872	0.0647	+78 +62
62 Tauri	6.1	5.43	13.2	24 6.7		22	38.5	+ 9	0.0	-0.4424	0.5866	0.0532	+15 -45
<i>v</i> Tauri	4.2	5.38	13.2	22 37.8		23	35.2	+ 9	54.6	+1.1368	0.5865	0.0507	+90 +49
72 Tauri	5.4	+5.38	+13.0	+22 48.8		23	59.1	+10	17.5	+0.9671	0.5864	+0.0497	+90 +35

NOVEMBER.

284 B. Tauri	6.0	+5.39	+11.8	+23 10.5	1	3	40.8	-10 9.4	+0.7614	0.5857	+0.0401	+90 +23
$\tau$ Tauri	4.3	+5.36	+11.2	+22 48.1		6	0.8	- 7 54.7	+1.2361	0.5852	+0.0340	+83 +60
95 Tauri	6.2	5.40	10.9	23 56.1		6	23.7	- 7 32.7	+0.0739	0.5851	+0.0331	+44 -13
300 B. Tauri	6.2	5.38	10.7	23 28.8		7	24.2	- 6 34.5	+0.5787	0.5848	+0.0305	+82 +14
315 B. Tauri	6.3	5.41	9.2	24 27.8		11	40.1	- 2 28.5	-0.3360	0.5835	+0.0194	+21 -35
99 Tauri	6.0	5.38	9.1	23 49.3		12	18.4	- 1 51.7	+0.3423	0.5834	+0.0178	+62 + 2
$k$ Tauri	5.6	+5.42	+ 8.8	+24 55.5		12	25.8	- 1 44.6	-0.8033	0.5833	+0.0174	- 7 -65
103 Tauri	5.5	5.37	7.8	24 9.5		16	29.8	+ 2 10.2	+0.0445	0.5819	+0.0070	+43 -13
118 Tauri	5.4	5.36	4.9	25 5.1	2	1	10.6	+10 31.2	-0.9624	0.5783	-0.0149	-18 -65
121 Tauri	5.1	5.29	4.4	23 59.2		3	45.1	-11 0.0	+0.1437	0.5770	+0.0213	+49 - 9
394 B. Tauri	6.0	5.23	3.6	23 10.0		7	2.6	- 7 49.9	+0.9232	0.5754	+0.0294	+90 +34
132 Tauri	5.0	+5.27	+ 2.6	+24 32.5		9	24.1	- 5 33.6	-0.6005	0.5741	-0.0351	+ 6 -55
412 B. Tauri	5.8	5.23	1.6	24 14.3		12	44.3	- 2 20.8	-0.4128	0.5722	+0.0431	+17 -42
1 Geminorum	4.3	5.16	0.9	23 16.1		15	47.7	+ 0 35.8	+0.4699	0.5704	+0.0502	+72 + 6
3 Geminorum	5.6	5.14	+ 0.4	23 7.7		18	11.2	+ 2 54.1	+0.4930	0.5690	+0.0558	+74 + 7
5 Geminorum	5.9	5.18	- 0.3	24 26.4		18	56.1	+ 3 37.5	-0.9392	0.5685	+0.0575	-16 -66
6 Geminorum	6.3	+5.12	+ 0.1	+22 55.7		19	17.6	+ 3 58.1	+0.6421	0.5683	-0.0583	+89 +14
$\eta$ Gemin. (var.)	3.2	5.09	- 0.1	22 31.9		20	23.9	+ 5 2.0	+0.9973	0.5676	+0.0608	+90 +36
8 Geminorum	6.1	5.14	0.7	23 59.9		20	59.4	+ 5 36.3	-0.5943	0.5672	+0.0622	+ 6 -57
9 Geminorum	6.2	5.13	0.7	23 46.2		21	16.6	+ 5 52.8	-0.3706	0.5670	+0.0628	+19 -41
$\mu$ Geminorum	3.2	5.06	1.2	22 33.4		23	52.2	+ 8 22.9	+0.7477	0.5654	+0.0686	+90 +19
36 B. Geminorum	6.0	+5.08	- 1.6	+23 22.4	3	0	58.8	+ 9 27.0	-0.1983	0.5647	-0.0710	+29 -32
$d$ Geminorum	5.2	4.90	4.4	21 51.5		12	25.1	- 3 30.9	+0.4673	0.5568	+0.0951	+71 + 1
$\zeta$ Gemin. (var.)	3.7	4.79	5.4	20 41.5		18	3.9	+ 1 56.3	+1.1527	0.5528	+0.1063	+90 +44
44 Geminorum	5.9	4.86	6.2	22 45.7		18	34.4	+ 2 25.7	-1.1246	0.5525	+0.1072	-31 -67
120 B. Geminorum	6.5	4.78	6.7	21 23.5		20	47.0	+ 4 33.8	+0.1061	0.5509	+0.1114	+46 -19
$\delta$ Geminorum	3.5	+4.75	- 7.7	+22 8.0	4	1	20.5	+ 8 58.2	-1.2227	0.5476	-0.1198	-42 -68
56 Geminorum	5.2	4.68	7.4	20 36.0		2	12.4	+ 9 48.3	+0.3279	0.5469	+0.1213	+60 - 9
149 B. Geminorum	6.4	4.68	8.3	21 42.0		4	27.8	+11 59.2	-1.1390	0.5453	+0.1253	-32 -68
61 Geminorum	5.8	4.66	7.9	20 25.3		4	30.9	-11 57.8	+0.2346	0.5452	+0.1254	+54 -15
63 Geminorum	5.3	4.69	8.5	21 36.8		4	52.3	-11 37.2	-1.0972	0.5450	+0.1260	-28 -68
79 Geminorum	6.3	+4.55	- 9.9	+20 30.8		13	3.6	- 3 42.1	-0.9989	0.5391	-0.1396	-19 -69
$g$ Geminorum	5.0	4.48	9.4	18 42.7		13	33.0	- 3 13.5	+0.8874	0.5388	+0.1404	+90 +20
209 B. Geminorum	6.2	4.48	10.3	19 32.1		16	18.7	- 0 33.2	-0.4013	0.5368	+0.1447	-18 -52
85 Geminorum	5.2	4.47	10.9	20 6.1		18	5.0	+ 1 9.7	-1.2751	0.5356	+0.1475	-48 -70
3 Cancri	5.7	4.37	10.5	17 32.0		20	35.5	+ 3 35.4	+1.1417	0.5338	+0.1512	+90 +38
10 H. Cancri	6.1	+4.38	-11.4	+19 4.5		22	29.6	+ 5 25.9	-0.8246	0.5325	-0.1539	- 7 -71



ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

NOVEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Parallels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declination.	Greenwich Mean Time.	Hour Angle, $H$	$Y''$	$x'$	$y'$	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
$\zeta$ Cancr ( <i>mean</i> )	4.7	+4.31	-11.8	+17 53.7	d 2 8.8	+ 8 58.2	-0.1129	0.5300	-0.1591	+34	-37
$\delta^2$ Cancr	6.2	4.19	13.0	17 19.0	8 54.1	- 8 29.0	-0.5865	0.5256	0.1630	+ 8	-67
90 B. Cancr	6.3	4.10	13.2	15 35.9	14 4.9	- 3 27.7	+0.4081	0.5224	0.1743	+65	-12
54 Cancr	6.3	3.99	14.4	15 39.3	21 40.2	+ 3 53.8	-1.0112	0.5180	0.1828	-18	-74
209 B. Cancr	6.5	3.80	14.7	11 53.9	6 7 26.1	-10 37.4	+1.2865	0.5129	0.1925	+88	+47
222 B. Cancr	6.3	+3.76	-15.2	+11 50.7	11 41.1	- 6 29.8	+0.5204	0.5108	-0.1963	+73	- 9
$\xi$ Leonis	5.1	3.65	16.2	11 39.8	19 10.3	+ 0 46.5	-0.7718	0.5076	0.2023	- 2	-78
$h$ Leonis	5.2	3.64	15.6	10 4.7	19 11.6	+ 0 47.6	+0.9746	0.5076	0.2023	+90	+17
$o$ Leonis	3.8	3.57	16.3	10 16.0	7 0 7.7	+ 5 35.4	-0.2402	0.5057	0.2059	+27	-51
83 B. Leonis	5.9	3.46	16.8	9 19.3	8 24.6	-10 21.7	-0.9247	0.5031	0.2111	-11	-81
89 B. Leonis	6.2	+3.45	-16.7	+ 8 42.4	9 20.0	- 9 27.8	-0.4381	0.5028	-0.2117	+17	-64
$\pi$ Leonis	4.9	3.43	16.8	8 26.3	10 28.5	- 8 21.2	-0.3840	0.5024	0.2123	+20	-60
155 B. Leonis	6.5	3.26	17.2	6 6.7	23 8.9	+ 3 58.1	-0.5374	0.4908	0.2103	+12	-72
237 B. Leonis	6.3	3.08	16.9	1 27.6	8 15 13.1	- 4 24.0	+1.0642	0.4984	0.2229	+90	+20
55 Leonis	6.1	3.07	16.9	1 10.5	17 8.7	- 2 31.5	+0.9504	0.4984	0.2232	+90	+12
$p^3$ Leonis	6.1	+3.02	-16.9	+ 0 26.5	21 32.6	+ 1 45.2	+0.7785	0.4985	-0.2239	+90	+ 2
$p^5$ Leonis	5.3	2.97	17.3	+ 0 22.6	9 3 10.5	+ 7 13.7	-0.4123	0.4909	0.2243	+18	-65
388 B. Leonis	6.3	2.90	17.1	- 1 14.9	11 0.2	- 9 9.4	-0.3708	0.4909	0.2242	+20	-62
$e$ Leonis	5.1	2.89	16.8	2 33.0	12 20.4	- 7 51.3	+0.7688	0.5002	0.2241	+87	+ 1
431 B. Leonis	6.2	2.85	17.1	1 58.9	16 47.8	- 3 31.3	-0.8567	0.5010	0.2236	- 7	-90
13 B. Virginis	5.9	+2.80	-16.6	- 4 52.6	23 43.7	+ 3 13.2	+0.7912	0.5028	-0.2224	+85	+ 2
64 B. Virginis	6.5	2.73	16.2	7 19.0	10 16.6	-10 31.6	+1.1477	0.5061	0.2192	+83	+27
$q$ Virginis	5.3	2.66	16.0	8 59.9	22 44.9	+ 1 35.5	+0.2934	0.5113	0.2133	+54	-24
370 B. Virginis	6.0	2.62	15.5	11 12.2	11 9 30.5	-11 57.7	+0.4469	0.5166	0.2063	+63	-16
75 Virginis	5.6	2.58	14.4	14 56.4	18 5 4.1	+ 7 0.7	+0.6408	0.5281	-0.1887	+72	- 5
NEW MOON.											
39 Ophiuchi	5.1	+3.00	- 4.0	-24 11.9	16 8 44.2	+ 7 12.5	+0.0532	0.5825	+0.0041	+18	-37
$\theta$ Ophiuchi	3.4	3.03	3.9	24 55.1	10 21.5	+ 8 46.1	+0.8158	0.5827	0.0083	+65	+ 8
191 B. Ophiuchi	6.3	3.03	3.5	24 10.2	11 38.0	+ 9 59.7	+0.0455	0.5829	0.0115	+18	-37
$b$ Ophiuchi	4.3	+3.03	- 3.5	-24 6.1	12 9.1	+10 29.8	-0.0197	0.5830	+0.0128	+15	-41
51 Ophiuchi	4.8	3.04	3.0	23 54.0	14 13.0	-11 31.2	-0.1974	0.5831	0.0181	+ 6	-52
63 Ophiuchi	6.1	3.14	1.5	24 52.3	23 46.8	- 2 19.1	+1.1035	0.5833	0.0425	+65	+31
4 Sagittarii	4.8	3.13	1.0	23 48.6	17 1 47.5	- 0 23.1	+0.0890	0.5833	0.0476	+23	-35
21 G. Sagittarii	5.7	3.12	0.6	22 46.8	2 40.2	+ 0 27.6	-0.9390	0.5832	0.0498	-33	-90
7 Sagittarii	5.5	+3.15	- 0.8	-24 17.0	3 1.9	+ 0 48.5	+0.6413	0.5831	+0.0507	+59	- 3
9 Sagittarii	6.0	3.16	- 0.7	24 21.8	3 26.9	+ 1 12.5	+0.7465	0.5831	0.0517	+66	+ 3
1 Sagittarii	5.2	3.17	0.0	23 43.2	6 39.7	+ 4 18.0	+0.2561	0.5828	0.0598	+34	-25
117 B. Sagittarii	5.8	3.26	+ 2.1	23 34.6	17 38.2	- 9 8.5	+0.9110	0.5809	0.0867	+66	+14
28 Sagittarii	5.6	3.27	3.0	22 28.7	20 52.5	- 6 1.5	+0.0696	0.5801	0.0945	+27	-36
30 Sagittarii	6.2	+3.27	+ 3.4	-22 15.4	22 44.1	- 4 14.2	+0.0199	0.5796	+0.0988	+24	-39
33 Sagittarii	5.8	3.27	3.8	21 27.7	18 0 3.1	- 2 58.2	-0.6696	0.5792	0.1019	-12	-90
$\gamma^1$ Sagittarii	5.0	3.30	3.5	22 50.8	0 6.0	- 2 55.3	+0.7662	0.5792	0.1020	+67	+ 4
$\gamma^2$ Sagittarii	5.1	3.31	3.6	22 46.5	0 29.4	- 2 32.9	+0.7315	0.5791	0.1029	+67	+ 2
154 B. Sagittarii	5.9	3.32	3.5	23 16.8	0 51.3	- 2 11.7	+1.2901	0.5790	0.1038	+66	+60
36 Sagittarii	5.1	+3.26	+ 4.3	-20 45.9	1 26.6	- 1 37.9	-1.2443	0.5788	+0.1051	-55	-85
$\xi$ Sagittarii	3.7	3.28	4.2	21 12.9	1 35.7	- 1 29.0	-0.7628	0.5788	0.1055	-17	-90
168 B. Sagittarii	6.3	3.33	4.1	22 48.7	3 11.3	+ 0 2.9	+1.0553	0.5783	0.1091	+67	+25
$o$ Sagittarii	3.9	3.32	4.5	21 51.8	4 27.9	+ 1 16.7	+0.2174	0.5779	0.1121	+37	-28
$\pi$ Sagittarii	3.0	3.32	5.2	21 9.3	6 35.4	+ 3 19.4	-0.2690	0.5772	0.1169	+11	-56
199 B. Sagittarii	6.4	+3.35	+ 5.2	-21 47.7	7 42.3	+ 4 23.8	+0.5227	0.5768	+0.1193	+56	-11

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

NOVEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y'</i>	<i>x'</i>	<i>y'</i>	N.	S.
		$\Delta\alpha$	$\Delta\delta$								
253 B. Sagittarii	6.1	+3.41	+6.8	-21 29.0	18 15 25.4	+11 49.8	+1.1862	0.5740	+0.1360	+69	+37
266 B. Sagittarii	6.1	3.38	7.9	19 2.1	17 47.3	-9 53.7	-1.0038	0.5731	0.1409	-29	-90
f Sagittarii	5.1	3.43	8.4	19 57.6	21 58.8	-5 51.4	+0.5546	0.5714	0.1494	+61	-9
57 Sagittarii	6.0	3.44	9.1	19 15.2	19 0 27.9	-3 27.6	+0.2083	0.5703	0.1543	+41	-28
31 B. Capricorni	6.4	3.52	13.0	16 0.8	16 13.7	+11 44.1	-0.4484	0.5636	0.1825	+9	-68
27 G. Capricorni	6.2	+3.50	+13.4	-15 19.9	17 15.6	-11 16.3	-0.9561	0.5632	+0.1842	-21	-90
47 B. Capricorni	6.2	3.57	13.2	16 48.5	19 11.3	-9 24.7	+0.9109	0.5623	0.1873	+73	+12
r Capricorni	5.2	3.54	14.1	15 14.6	20 50.7	-7 48.8	-0.3752	0.5616	0.1898	+14	-63
61 B. Capricorni	5.9	3.57	13.8	16 25.0	21 23.5	-7 17.1	+0.9269	0.5614	0.1907	+74	+12
95 B. Capricorni	5.9	3.62	15.6	14 48.0	20 5 25.2	+0 27.7	+0.8549	0.5582	0.2023	+75	+8
v Aquarii	4.5	+3.61	+17.4	-11 42.2	10 17.8	+5 10.1	-1.2973	0.5563	+0.2087	-48	-86
53 B. Aquarii	6.5	3.67	17.2	13 32.5	13 8.7	+7 55.1	+1.1737	0.5552	0.2121	+76	+31
72 B. Aquarii	6.5	3.69	18.6	11 55.4	18 39.7	-10 45.3	+0.7140	0.5534	0.2184	+78	-1
137 B. Capricorni	6.2	3.72	19.6	10 56.7	23 45.3	-5 50.1	+0.8457	0.5518	0.2236	+79	+6
c' Capricorni	5.3	3.73	20.5	9 27.5	21 2 17.0	-3 23.6	-0.0963	0.5510	0.2260	+32	-45
c <sup>2</sup> Capricorni	6.3	+3.74	+20.5	-9 39.2	2 51.5	-2 50.3	+0.2321	0.5509	+0.2265	+51	-28
30 Aquarii	5.6	3.78	22.5	6 55.1	10 38.5	+4 40.9	-0.7552	0.5490	0.2329	-2	-90
44 Aquarii	5.7	3.83	23.6	5 47.7	17 0.2	+10 49.9	-0.3967	0.5478	0.2371	+18	-64
51 Aquarii	5.8	3.86	24.1	5 15.0	20 13.9	-10 3.0	-0.1800	0.5473	0.2389	+30	-50
187 B. Aquarii	6.3	3.86	25.1	3 19.8	23 33.6	-6 49.9	-1.3268	0.5469	0.2405	-47	-86
κ Aquarii	5.2	+3.91	+24.8	-4 39.0	22 2 32.1	-3 57.4	+0.7265	0.5466	+0.2417	+85	-1
207 B. Aquarii	6.3	3.92	25.2	3 58.7	3 56.5	-2 35.8	+0.3886	0.5465	0.2423	+62	-20
6 G. Piscium	6.2	4.00	26.2	2 50.0	12 1.4	+5 12.9	+1.1963	0.5462	0.2444	+87	+31
3 Piscium	6.3	4.00	27.0	0 15.2	13 7.8	+6 17.1	-1.1419	0.5462	0.2446	-26	-90
22 B. Piscium	6.4	4.12	27.8	-0 9.4	23 42.9	-7 28.9	+1.3550	0.5469	0.2450	+81	+50
κ Piscium	4.9	+4.14	+28.1	+0 48.5	23 1 17.2	-5 57.8	+0.7643	0.5470	+0.2448	+90	+1
9 Piscium	6.4	4.14	28.1	0 40.5	1 26.0	-5 49.4	+0.9360	0.5470	0.2448	+90	+12
16 Piscium	5.7	4.17	28.7	1 39.0	5 39.2	-1 44.5	+0.9832	0.5477	0.2441	+90	+15
19 Piscium	5.4	4.23	29.1	3 2.1	10 15.1	+2 42.2	+0.7046	0.5485	0.2429	+90	-2
ω Piscium	4.0	4.31	30.1	6 24.7	16 9.8	+8 25.0	-1.2763	0.5498	0.2406	-39	-84
36 Piscium	6.2	+4.40	+30.5	+7 47.3	24 0 1.5	-7 59.4	-0.7899	0.5520	+0.2363	-3	-82
d Piscium	5.4	4.43	30.5	7 44.3	1 51.0	-6 13.6	-0.3091	0.5525	0.2351	+23	-56
136 B. Piscium	6.5	4.55	30.3	8 54.6	11 7.5	+2 43.9	+0.6547	0.5558	0.2278	+86	-3
75 Piscium	6.3	4.74	30.6	12 31.2	22 22.2	-10 24.9	-0.4937	0.5603	0.2162	+14	-65
η Piscium	3.7	4.92	29.9	14 55.6	25 9 14.8	+0 4.6	-0.6524	0.5652	0.2021	+5	-73
101 Piscium	6.2	+4.93	+29.5	+14 14.7	11 6.4	+1 52.3	+0.4109	0.5660	+0.1994	+65	-12
105 Piscium	6.1	4.99	29.6	15 59.6	12 46.7	+3 28.9	-1.0283	0.5668	0.1970	-20	-74
4 Arietis	5.8	5.04	29.2	16 33.1	16 25.7	+7 0.0	-0.8852	0.5685	0.1913	-10	-73
ι Arietis	5.1	5.11	28.8	17 25.2	20 20.3	+10 46.1	-1.0323	0.5703	0.1850	-20	-73
35 B. Arietis	6.4	5.15	28.4	17 51.8	23 2.3	-10 37.7	-0.9882	0.5715	0.1803	-17	-72
47 B. Arietis	6.5	+5.17	+28.1	+17 38.5	26 0 45.4	-8 58.4	-0.4573	0.5723	+0.1773	+15	-58
20 H <sup>1</sup> Arietis	6.4	5.17	27.6	16 50.6	1 26.5	-8 18.8	+0.4752	0.5726	0.1761	+70	-6
26 Arietis	6.2	5.34	26.9	19 29.7	10 20.5	+0 15.4	-0.7269	0.5765	0.1594	-1	-71
μ Arietis	5.7	5.40	25.4	19 39.9	15 12.8	+4 56.9	-0.1485	0.5785	0.1495	+32	-37
47 Arietis	5.8	5.51	24.0	20 20.6	21 41.1	+11 10.6	+0.0833	0.5809	0.1357	+45	-23
ε Arietis (mean)	4.6	+5.52	+24.0	+21 0.9	22 9.0	+11 37.4	-0.5404	0.5811	+0.1347	+10	-59
ζ Arietis	5.0	5.57	22.2	20 44.6	27 4 34.5	-6 11.7	+0.5572	0.5831	0.1203	+79	+4
ρ Arietis	5.2	5.61	21.6	20 51.3	7 8.9	-3 43.1	+0.7462	0.5839	0.1143	+90	+15
63 Arietis	5.2	5.59	21.4	20 27.1	7 46.6	-3 6.9	+1.2302	0.5840	0.1128	+88	+53
65 Arietis	6.0	5.60	21.2	20 30.9	8 27.5	-2 27.5	+1.2417	0.5842	0.1112	+86	+55
66 Arietis	6.1	+5.69	+20.8	+22 31.5	10 3.8	-0 54.3	-0.8417	0.5846	+0.1074	+4	-63

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

NOVEMBER.

THE STAR'S						AT CONJUNCTION IN R. A.						Limiting Par- allels.			
Name.		Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, <i>H</i>	<i>Y'</i>	<i>x'</i>	<i>y'</i>	<i>N.</i>	<i>S.</i>			
			$\Delta\alpha$	$\Delta\delta$											
			<i>s</i>	<i>"</i>	<i>"</i>	<i>d</i>	<i>h</i>	<i>m</i>	<i>h</i>	<i>m</i>	<i>"</i>	<i>"</i>			
23	Tauri	4.3	+5.80	+18.9	+23 41.8	27	17	17.5	+ 6	2.1	-1.1332	0.5860	+0.0899	-33	-66
7	Tauri	3.0	5.81	18.7	23 51.3		17	45.4	+ 6	29.1	-1.2549	0.5861	0.0888	-50	-66
104 B.	Tauri	5.5	5.79	18.6	23 10.3		18	6.8	+ 6	49.6	-0.5220	0.5862	0.0879	+10	-53
27	Tauri	3.7	5.81	18.5	23 48.3		18	26.1	+ 7	8.2	-1.1453	0.5862	0.0871	-34	-66
28	Tauri	5.2	5.82	18.5	23 53.4		18	26.7	+ 7	8.7	-1.2304	0.5862	0.0871	-46	-66
133 B.	Tauri	5.9	+5.75	+18.3	+21 59.9		18	45.8	+ 7	27.1	+0.7428	0.5863	+0.0863	+90	+18
32	Tauri	5.8	5.78	17.5	22 14.7		21	33.8	+10	8.6	+0.7212	0.5866	0.0793	+90	+17
33	Tauri	6.0	5.80	17.6	22 56.4		21	38.2	+10	12.9	+0.0105	0.5866	0.0791	+40	-21
161 B.	Tauri	6.5	5.82	17.0	22 58.4		23	12.2	+11	43.3	+0.0983	0.5868	0.0752	+46	-16
36	Tauri	5.6	5.86	16.6	23 53.0	28	0	34.0	-10	58.1	-0.7400	0.5869	0.0718	-3	-66
192 B.	Tauri	6.1	+5.81	+15.6	+22 12.3		4	0.7	- 7	39.4	+1.2233	0.5870	+0.0630	+86	+57
62	Tauri	6.1	5.92	14.1	24 6.7		8	28.6	- 3	21.9	-0.4912	0.5870	0.0516	+12	-48
v	Tauri	4.2	5.86	13.8	22 37.8		9	25.4	- 2	27.1	+1.0904	0.5870	0.0491	+90	+45
72	Tauri	5.4	5.87	13.7	22 48.8		9	49.3	- 2	4.2	+0.9195	0.5870	0.0481	+90	+32
284 B.	Tauri	6.0	5.91	12.4	23 10.5		13	31.3	+ 1	29.2	+0.7068	0.5867	0.0386	+90	+20
r	Tauri	4.3	+5.89	+11.7	+22 48.1		15	51.4	+ 3	43.8	+1.1782	0.5864	+0.0325	+90	+54
95	Tauri	6.2	5.94	11.5	23 56.1		16	14.2	+ 4	5.8	+0.0138	0.5864	0.0315	+41	-17
300 B.	Tauri	6.2	5.92	11.2	23 28.8		17	14.7	+ 5	4.0	+0.5176	0.5862	0.0289	+76	+10
315 B.	Tauri	6.3	5.98	9.7	24 27.8		21	30.2	+ 9	9.7	-0.4047	0.5855	0.0179	+17	-40
99	Tauri	6.0	5.95	9.5	23 49.3		22	8.4	+ 9	46.4	+0.2731	0.5854	0.0163	+57	-1
k	Tauri	5.6	+6.00	+ 9.4	+24 55.5		22	15.8	+ 9	53.5	-0.8734	0.5853	+0.0160	-12	-65
103	Tauri	5.5	5.97	8.1	24 9.5	29	2	19.1	-10	12.6	-0.0313	0.5843	+0.0055	+38	-16
118	Tauri	5.4	6.01	5.0	25 5.1		10	57.2	- 1	54.1	-1.0498	0.5815	-0.0164	-26	-65
121	Tauri	5.1	5.95	4.2	23 59.2		13	30.8	+ 0	33.7	+0.0512	0.5805	0.0228	+43	-14
394 B.	Tauri	6.0	5.91	3.2	23 10.0		16	46.8	+ 3	42.4	+0.8246	0.5791	0.0309	+90	+28
132	Tauri	5.0	+5.96	+ 2.3	+24 32.5		19	7.2	+ 5	57.6	-0.6992	0.5780	-0.0366	0	-64
412 B.	Tauri	5.8	5.94	1.2	24 14.3		22	25.7	+ 9	8.5	-0.5163	0.5764	0.0447	+10	-49
1	Geminorum	4.3	5.88	+ 0.2	23 16.1	30	1	27.3	-11	56.5	+0.3599	0.5748	0.0519	+63	0
3	Geminorum	5.6	5.87	- 0.5	23 7.7		3	49.4	- 9	39.6	+0.3797	0.5735	0.0574	+64	0
5	Geminorum	5.9	5.92	1.0	24 26.4		4	33.9	- 8	56.7	-1.0489	0.5731	0.0592	-25	-66
6	Geminorum	6.3	+5.85	- 0.8	+22 55.7		4	55.2	- 8	36.3	+0.5268	0.5729	-0.0600	+76	+ 8
7	Gemin. ( <i>var.</i> )	3.2	5.82	1.2	22 31.9		6	0.7	- 7	33.1	+0.8793	0.5723	0.0625	+90	+28
8	Geminorum	6.1	5.89	1.6	23 59.8		6	35.8	- 6	59.2	-0.7077	0.5719	0.0639	-1	-65
9	Geminorum	6.2	5.88	1.6	23 46.2		6	52.9	- 6	42.8	-0.4851	0.5717	0.0645	+12	-49
14	Geminorum	3.2	5.81	2.4	22 33.4		9	26.8	- 4	14.5	+0.6260	0.5702	0.0703	+87	+12
36 B.	Geminorum	6.0	+5.84	- 2.8	+23 22.4		10	32.6	- 3	11.1	-0.3179	0.5695	-0.0728	+22	-39
d	Geminorum	5.2	+5.70	- 6.1	+21 51.5		21	50.5	+ 7	42.5	+0.3312	0.5621	-0.0971	+61	- 6

DECEMBER.

5	Gemin. (var.)	3.7	+5.61	- 7.6	+20 41.5	1 3 24.8	-10 54.8	+1.0069	0.5582	-0.1082	+90	+32
44	Geminorum	5.9	5.68	8.1	22 45.6	3 54.9	-10 25.8	-1.2598	0.5578	0.1092	-49	-67
120 B.	Geminorum	6.5	5.60	8.9	21 23.4	6 5.6	- 8 19.6	-0.0374	0.5563	0.1134	+38	-27
56	Geminorum	5.2	5.53	9.9	20 35.9	11 26.6	- 3 9.6	+0.1776	0.5524	0.1234	+51	-17
149 B.	Geminorum	6.4	5.53	10.8	21 42.0	13 40.0	- 1 0.7	-1.2838	0.5507	0.1274	-53	-68
61	Geminorum	5.8	+5.50	-10.5	+20 25.3	13 43.1	- 0 57.7	+0.0828	0.5507	-0.1275	+45	-22
63	Geminorum	5.3	5.54	10.9	21 36.8	14 4.1	- 0 37.4	-1.2426	0.5504	0.1281	-45	-68
79	Geminorum	6.3	5.42	12.8	20 30.8	22 8.4	+ 7 10.7	-1.1522	0.5445	0.1417	-32	-69
g	Geminorum	5.0	5.35	12.5	18 42.6	22 37.4	+ 7 38.8	+0.7233	0.5441	0.1425	+90	+10
209 B.	Geminorum	6.2	5.35	13.4	19 32.1	2 1 20.7	+10 16.8	-0.5607	0.5421	0.1468	+ 9	-62
3	Canceri	5.7	+5.24	-13.9	+17 32.0	5 33.9	- 9 38.3	+0.9705	0.5390	-0.1532	+90	+24

## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.	
Name.	Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	$\gamma''$	$\alpha''$	$\delta''$	N.	S.
		$\Delta\alpha$	$\Delta\delta$		d h m	h m					
10 H. Cancri	6.1	+5.27	-14.8	+19 4.4	2 7 26.3	-7 49.4	-0.9866	0.5376	-0.1560	-18	-71
5 Cancri ( <i>mean</i> )	4.7	5.20	15.4	17 53.7	11 2.5	-420.2	-0.2816	0.5350	0.1611	+24	-46
27 Cancri	6.2	5.08	16.7	17 19.0	17 42.3	+2 7.1	-0.7577	0.5304	0.1609	-2	-73
90 B. Cancri	6.3	4.99	17.2	15 35.8	22 49.0	+7 4.2	+0.2289	0.5268	0.1762	+53	-21
54 Cancri	6.3	4.90	18.6	15 39.2	3 6 18.7	-939.8	-1.1874	0.5220	0.1845	-33	-74
209 B. Cancri	6.5	+4.70	-19.4	+11 53.9	15 58.1	-0 17.6	+1.0956	0.5163	-0.1940	+90	+28
222 B. Cancri	6.3	4.65	20.0	11 50.6	29 10.6	+3 47.5	+0.3317	0.5139	0.1976	+59	-19
5 Leonis	5.1	4.55	21.1	11 39.7	4 3 35.7	+10 59.6	-0.9572	0.5102	0.2034	-14	-78
h Leonis	5.2	4.53	20.5	10 4.6	3 36.9	+11 0.8	+0.7826	0.5102	0.2034	+90	+5
o Leonis	3.8	4.47	21.3	10 15.9	8 30.7	-8 13.8	-0.4284	0.5080	0.2067	+17	-62
83 B. Leonis	5.9	+4.36	-22.0	+9 19.3	16 44.4	-0 14.0	-1.1113	0.5047	-0.2117	-24	-81
89 B. Leonis	6.2	4.35	22.0	8 42.3	17 39.5	+0 39.5	-0.6261	0.5044	0.2122	+7	-78
$\pi$ Leonis	4.9	4.33	22.0	8 26.2	18 47.7	+1 45.8	-0.5721	0.5040	0.2128	+10	-74
14 Sextantis	6.3	4.25	21.6	6 0.7	22 23.6	+5 15.7	+1.3372	0.5027	0.2145	+83	+50
155 B. Leonis	6.5	4.14	22.6	6 6.6	5 7 25.0	-9 57.9	-0.7238	0.5003	0.2182	+1	-84
237 B. Leonis	6.3	+3.95	-22.2	+1 27.5	23 28.3	+5 39.0	+0.8813	0.4978	-0.2221	+90	+8
55 Leonis	6.1	3.93	22.2	1 10.4	6 1 24.0	+7 31.6	+0.7687	0.4976	0.2224	+90	+1
p <sup>3</sup> Leonis	6.1	3.87	22.2	0 26.4	5 48.3	+11 48.7	+0.5994	0.4975	0.2228	+79	-8
p <sup>2</sup> Leonis	5.3	3.82	22.5	+0 22.6	11 26.9	-6 42.0	-0.5879	0.4975	0.2231	+7	-98
368 B. Leonis	6.3	3.74	22.3	-1 14.9	19 18.2	+0 56.5	-0.5413	0.4981	0.2227	+11	-74
e Leonis	5.1	+3.73	-21.9	-2 33.1	20 38.7	+2 14.8	+0.5998	0.4983	-0.2226	+79	-8
431 B. Leonis	6.2	3.69	22.2	1 59.0	7 1 7.3	+6 36.0	-1.0233	0.4989	0.2220	-18	-90
13 B. Virginis	5.9	3.62	21.4	4 52.7	8 5.4	-10 37.4	+0.6316	0.5004	0.2205	+81	-6
64 B. Virginis	6.5	3.54	20.8	7 19.1	18 42.0	-0 18.5	+0.9983	0.5034	0.2171	+83	+16
q Virginis	5.3	3.44	20.2	9 0.0	8 7 15.3	+11 53.5	+0.1557	0.5083	0.2111	+46	-32
370 B. Virginis	6.0	+3.38	-19.3	-11 12.2	18 5.1	-1 35.2	+0.3212	0.5136	-0.2041	+55	-23
75 Virginis	5.6	3.28	17.5	14 56.5	9 13 45.6	-6 30.0	+0.5983	0.5255	0.1867	+66	-11
83 Virginis	5.6	3.27	16.9	15 46.0	19 31.2	-0 55.1	+0.3758	0.5295	0.1803	+54	-20
85 Virginis	6.1	3.26	17.0	15 21.3	20 3.6	-0 23.7	-0.1671	0.5299	0.1797	+24	-50
214 G. Virginis	6.5	3.22	16.2	15 56.6	10 5 35.5	+8 50.2	-1.1860	0.5367	0.1678	-40	-90
43 H. Virginis	5.5	+3.22	-15.3	-17 49.1	10 25.3	-10 29.3	+0.6410	0.5404	-0.1611	+33	-38
231 G. Virginis	6.4	3.23	15.1	18 12.3	11 12.1	-9 44.0	+0.3311	0.5410	0.1600	+49	-22
236 G. Virginis	5.7	3.22	15.1	18 20.2	11 56.7	-9 0.8	+0.3541	0.5415	0.1539	+50	-21
9 G. Libræ	6.5	3.22	14.0	20 4.8	19 29.0	-1 43.4	+1.0684	0.5473	0.1474	+70	+24
17 G. Libræ	6.4	3.21	13.4	20 49.7	11 0 40.5	+3 17.6	+1.1244	0.5513	0.1388	+69	+30
18 G. Libræ	6.1	+3.21	-13.3	-20 58.9	1 8.8	+3 44.9	+1.2220	0.5516	-0.1380	+69	+41
43 B. Libræ	5.7	3.27	14.4	21 2.8	5 43.5	+8 10.3	+0.6762	0.5551	0.1299	+67	-2
47 G. Libræ	6.1	3.21	12.2	21 42.8	9 46.4	-11 55.2	+0.8736	0.5582	0.1225	+68	+11
64 G. Libræ	5.8	3.20	-11.6	22 5.8	14 9.6	-7 41.2	+0.7604	0.5615	-0.1140	+68	+3
NEW MOON.											
253 B. Sagittarii	6.1	+3.30	+7.0	-21 29.0	15 22 13.5	-3 34.5	+1.2372	0.5823	+0.1387	+69	+43
266 B. Sagittarii	6.1	3.25	7.9	19 2.1	16 0 31.8	-1 21.5	-0.9270	0.5813	0.1437	-24	-90
f Sagittarii	5.1	3.28	8.4	19 57.6	4 37.2	+2 34.6	+0.6173	0.5795	0.1522	+65	-6
57 Sagittarii	6.0	3.29	9.0	19 15.2	7 2.7	+4 54.7	+0.2765	0.5784	0.1571	+44	-25
31 B. Capricorni	6.4	+3.31	+12.5	-13 0.8	22 26.6	-4 15.6	-0.3639	0.5709	+0.1854	+13	-62
27 G. Capricorni	6.2	3.29	12.7	15 19.9	23 27.2	-3 17.3	-0.8664	0.5704	0.1871	-15	-90
47 B. Capricorni	6.2	3.35	12.7	16 48.5	1 20.4	-1 23.1	+0.9840	0.5695	0.1901	+73	+16
r Capricorni	5.2	3.32	13.4	15 14.6	2 57.7	+0 5.6	-0.2894	0.5687	0.1928	+18	-57
61 B. Capricorni	5.9	3.34	13.3	16 25.0	3 29.5	+0 36.6	+1.0011	0.5684	0.1935	+74	+18
95 B. Capricorni	5.9	+3.37	+14.8	-14 48.0	11 21.9	+8 11.7	+0.9344	0.5644	+0.2049	+75	+13

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

THE STAR'S					AT CONJUNCTION IN R. A.					Limiting Par- allels.		
Name.		Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.	Hour Angle, H	Y'	z'	y'	N.	S.
			Δα	Δδ								
		s	"	'		d h m	h m				°	°
r	Aquarii	4.5	+3.35	+16.4	-11 42.2	17 16 9.0	-11 11.2	-1.1988	0.5621	+0.2112	-37	-90
53 B.	Aquarii	6.5	3.40	16.2	13 32.5	18 57.0	- 8 29.3	+1.2546	0.5608	0.2146	+76	+39
19	Aquarii	5.6	3.38	17.6	10 5.9	23 3.5	- 4 31.3	-1.3336	0.5590	0.2192	-53	-81
72 B.	Aquarii	6.5	3.41	17.4	11 55.4	18 0 22.7	- 3 14.9	+0.8008	0.5584	0.2206	+78	+ 4
137 B.	Capricorni	6.2	3.44	18.4	10 56.7	5 24.0	+ 1 35.9	+0.9336	0.5562	0.2256	+79	+12
c <sup>1</sup>	Capricorni	5.3	+3.44	+19.2	- 9 27.5	7 53.7	+ 4 0.5	-0.0023	0.5552	+0.2278	+37	-40
c <sup>2</sup>	Capricorni	6.3	3.45	19.2	9 39.3	8 27.7	+ 4 33.3	+0.3244	0.5550	0.2283	+56	-23
30	Aquarii	5.6	3.48	21.0	6 55.1	16 9.6	+11 59.4	-0.6571	0.5521	0.2343	+ 3	-85
44	Aquarii	5.7	3.52	22.0	5 47.8	22 23.1	- 5 54.5	-0.2998	0.5501	0.2381	+23	-57
51	Aquarii	5.8	3.55	22.4	5 15.1	19 1 40.6	- 2 49.0	-0.0838	0.5492	0.2397	+35	-45
187 B.	Aquarii	6.3	+3.56	+23.4	- 3 19.8	4 59.3	+ 0 23.1	-1.2285	0.5484	+0.2411	-35	-90
κ	Aquarii	5.2	3.60	23.1	4 39.0	7 57.1	+ 3 14.9	+0.8214	0.5477	0.2422	+85	+ 4
207 B.	Aquarii	6.3	3.62	23.5	3 58.8	9 21.3	+ 4 36.2	+0.4339	0.5474	0.2426	+69	-14
6 G.	Piscium	6.2	3.70	24.4	2 50.0	17 25.7	-11 35.4	+1.2919	0.5461	0.2442	+87	+41
3	Piscium	6.3	3.69	25.5	0 15.2	18 32.1	-10 31.2	-1.0475	0.5459	0.2443	-19	-90
κ	Piscium	4.9	+3.84	+26.4	+ 0 48.5	20 6 44.3	+ 1 16.7	+0.8589	0.5451	+0.2437	+90	+ 7
9	Piscium	6.4	3.84	26.4	0 40.4	6 53.1	+ 1 25.1	+1.0310	0.5451	0.2437	+90	+18
16	Piscium	5.7	3.88	26.9	1 33.9	11 8.2	+ 5 31.9	+1.0780	0.5451	0.2427	+90	+21
19	Piscium	5.4	3.94	27.4	3 2.0	15 46.6	+10 1.0	+0.7973	0.5454	0.2412	+90	+ 3
ω	Piscium	4.0	4.03	28.6	6 24.7	21 45.2	- 8 12.3	-1.1955	0.5460	0.2385	-31	-84
36	Piscium	6.2	+4.13	+29.1	+ 7 47.3	21 5 43.3	- 0 30.2	-0.7109	0.5472	+0.2338	+ 2	-82
d	Piscium	5.4	4.16	29.1	7 44.2	7 34.5	+ 1 17.3	-0.2279	0.5476	0.2325	+28	-51
136 B.	Piscium	6.5	4.30	29.0	8 54.6	17 0.6	+10 24.3	+0.7386	0.5499	0.2249	+90	+ 2
58	Piscium	5.7	4.37	29.9	11 31.8	19 38.8	-11 2.8	-1.3395	0.5506	0.2224	-51	-76
75	Piscium	6.3	4.52	29.5	12 31.2	22 4 28.9	- 2 30.8	-0.4260	0.5534	0.2130	+17	-60
η	Piscium	3.7	+4.74	+29.3	+14 55.6	15 36.3	+ 8 13.6	-0.5934	0.5576	+0.1988	+ 8	-69
101	Piscium	6.2	4.76	28.8	14 14.7	17 30.7	+10 4.0	+0.4798	0.5584	0.1962	+70	- 9
105	Piscium	6.1	4.82	29.1	15 59.6	19 13.4	+11 43.1	-0.9757	0.5590	0.1937	-16	-74
4	Arietis	5.8	4.89	28.8	16 33.0	22 57.7	- 8 40.4	-0.8338	0.5605	0.1881	- 7	-73
ι	Arietis	5.1	4.97	28.4	17 25.2	23 2 58.2	- 4 48.4	-0.9852	0.5622	0.1817	-17	-73
35 B.	Arietis	6.4	+5.02	+28.1	+17 51.8	5 44.3	- 2 8.1	-0.9425	0.5634	+0.1772	-14	-72
47 B.	Arietis	6.5	5.05	27.8	17 38.5	7 30.1	- 0 26.1	-0.4068	0.5641	0.1742	+18	-54
20 II <sup>1</sup> .	Arietis	6.4	5.06	27.3	16 50.6	8 12.3	+ 0 14.5	+0.5358	0.5644	0.1730	+75	- 3
26	Arietis	6.2	5.27	26.5	19 29.7	17 20.0	+ 9 2.6	-0.6861	0.5682	0.1564	+ 2	-70
μ	Arietis	5.7	5.35	25.5	19 39.9	22 20.0	-10 8.3	-0.1043	0.5702	0.1468	+34	-34
47	Arietis	5.8	+5.49	+24.1	+20 20.6	24 4 58.3	- 3 44.5	+0.1259	0.5727	+0.1332	+47	-20
ε	Arietis (mean)	4.6	5.50	24.2	21 0.9	5 26.9	- 3 17.0	-0.5053	0.5729	0.1322	+12	-56
ζ	Arietis	5.0	5.60	22.4	20 44.6	12 2.2	+ 3 3.7	+0.6005	0.5752	0.1180	+83	+ 6
τ	Arietis	5.2	5.65	21.8	20 51.3	14 40.5	+ 5 36.2	+0.7899	0.5760	0.1121	+90	+18
63	Arietis	5.2	5.64	21.6	20 27.1	15 19.1	+ 6 13.3	+1.2789	0.5762	0.1107	+77	+61
65	Arietis	6.0	+5.65	+21.4	+20 30.9	16 1.0	+ 6 53.7	+1.2899	0.5764	+0.1091	+73	+64
66	Arietis	6.1	5.75	21.3	22 31.5	17 39.7	+ 8 28.7	-0.6153	0.5769	0.1054	+ 5	-61
23	Tauri	4.3	5.90	19.5	23 41.8	25 1 3.6	- 8 24.0	-1.1163	0.5787	0.0882	-31	-66
η	Tauri	3.0	5.91	19.4	23 51.3	1 32.2	- 7 56.4	-1.2396	0.5788	0.0871	-47	-66
104 B.	Tauri	5.5	5.89	19.1	23 10.3	1 54.2	- 7 35.3	-0.4990	0.5789	0.0862	+12	-52
27	Tauri	3.7	+5.92	+19.1	+23 48.4	2 13.9	- 7 16.3	-1.1292	0.5790	+0.0854	-32	-66
28	Tauri	5.2	5.92	19.2	23 53.4	2 14.4	- 7 15.8	-1.2152	0.5790	0.0854	-43	-66
133 B.	Tauri	5.9	5.86	18.6	21 59.9	2 34.0	- 6 56.9	+0.7787	0.5791	0.0846	+90	+20
32	Tauri	5.8	5.91	17.8	22 14.7	5 25.8	- 4 11.7	+0.7549	0.5796	0.0777	+90	+19
33	Tauri	6.0	5.93	18.0	22 56.4	5 30.3	- 4 7.2	+0.0369	0.5796	0.0776	+42	-20
161 B.	Tauri	6.5	+5.96	+17.5	+22 58.4	7 6.4	- 2 34.8	+0.1246	0.5799	+0.0787	+47	-



## ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

THE STAR'S						AT CONJUNCTION IN R. A.						Limiting Pa- allels.			
Name.		Mag.	Red'ns from 1917.0.		Apparent Declina- tion.	Greenwich Mean Time.			Hour Angle, H		Y	$\alpha'$	$\gamma'$	N.	S.
			$\Delta\alpha$	$\Delta\delta$											
			s	"	'	d	h	m	h	m					
36	Tauri	5.6	+6.01	+17.2	+23 53.0	25	8	30.0	- 1 14.4	-0.7230	0.5801	+0.0703	- 2	4	
192 B.	Tauri	6.1	5.98	15.8	22 12.3		12	1.1	+ 2 8.8	+1.2578	0.5806	0.0617	+79	6	
62	Tauri	6.1	6.12	14.6	24 6.8		16	34.5	+ 6 31.8	-0.4761	0.5809	0.0505	+13	4	
v	Tauri	4.2	6.07	14.0	22 37.8		17	32.5	+ 7 27.6	+1.1198	0.5810	0.0480	+90	4	
72	Tauri	5.4	6.07	14.0	22 48.9		17	56.8	+ 7 51.1	+0.9471	0.5810	0.0470	+90	4	
234 B.	Tauri	6.0	+6.14	+12.7	+23 10.5		21	43.1	+11 28.8	+0.7301	0.5810	+0.0376	+90	4	
r	Tauri	4.3	6.13	11.9	22 48.1	26	0	5.7	-10 14.0	+1.2041	0.5810	0.0317	+89	4	
95	Tauri	6.2	6.19	11.9	23 56.2		0	29.0	- 9 51.6	+0.0292	0.5810	0.0307	+42	2	
300 B.	Tauri	6.2	6.18	11.5	23 28.8		1	30.5	- 8 52.4	+0.5368	0.5810	0.0281	+78	4	
315 B.	Tauri	6.3	6.26	10.1	24 27.8		5	50.4	- 4 42.3	-0.3956	0.5806	0.0172	+18	2	
99	Tauri	6.0	+6.24	+ 9.8	+23 49.4		6	29.2	- 4 5.0	+0.2873	0.5805	+0.0156	+58	2	
k	Tauri	5.6	6.29	9.8	24 55.6		6	36.7	- 3 57.8	-0.8686	0.5805	0.0153	-12	2	
103	Tauri	5.5	6.28	8.3	24 9.5		10	43.9	+ 0 0.1	-0.0218	0.5800	+0.0050	+39	2	
118	Tauri	5.4	6.38	5.2	25 5.1		19	29.3	+ 8 25.9	-1.0515	0.5781	-0.0168	-26	2	
121	Tauri	5.1	6.34	4.2	23 59.2		22	4.7	+10 55.5	+0.0557	0.5774	0.0232	+43	2	
394 B.	Tauri	6.0	+6.32	+ 3.0	+23 10.0	27	1	23.0	- 9 53.6	+0.8322	0.5763	-0.0312	+90	2	
132	Tauri	5.0	6.39	2.2	24 32.5		3	44.9	- 7 36.9	-0.7018	0.5755	0.0370	0	2	
412 B.	Tauri	5.8	6.39	+ 1.0	24 14.3		7	5.3	- 4 24.0	-0.5192	0.5742	0.0450	+10	2	
1	Geminorum	4.3	6.35	- 0.2	23 16.1		10	8.5	- 1 27.4	+0.3603	0.5730	0.0521	+63	2	
3	Geminorum	5.6	6.34	1.0	23 7.7		12	31.7	+ 0 50.6	+0.3791	0.5719	0.0577	+64	2	
5	Geminorum	5.9	+6.41	- 1.3	+24 26.4		13	16.6	+ 1 33.7	-1.0567	0.5716	-0.0594	-26	2	
6	Geminorum	6.3	6.34	1.4	22 55.7		13	38.0	+ 1 54.4	+0.5264	0.5714	0.0603	+76	2	
7	Gemin. (var.)	3.2	6.31	1.8	22 31.9		14	44.0	+ 2 53.0	+0.8800	0.5709	0.0628	+90	2	
8	Geminorum	6.1	6.39	2.0	23 59.8		15	19.4	+ 3 32.1	-0.7145	0.5706	0.0641	- 1	2	
9	Geminorum	6.2	6.38	2.1	23 46.2		15	36.5	+ 3 48.7	-0.4910	0.5705	0.0648	+12	2	
$\mu$	Geminorum	3.2	+6.33	- 3.1	+22 33.4		18	11.4	+ 6 18.0	+0.6238	0.5692	-0.0706	+87	2	
36 B.	Geminorum	6.0	6.36	3.4	23 22.4		19	17.6	+ 7 21.8	-0.3245	0.5687	0.0731	+22	2	
d	Geminorum	5.2	6.27	7.3	21 51.5	28	6	38.2	- 5 41.9	+0.3227	0.5624	0.0975	+61	2	
e	Gemin. (var.)	3.7	6.21	9.1	20 41.4		12	13.1	- 0 18.7	+0.9978	0.5590	0.1087	+90	2	
44	Geminorum	5.9	6.30	9.4	22 45.6		12	43.2	+ 0 10.4	-1.2742	0.5586	0.1097	-53	2	
120 B.	Geminorum	6.5	+6.22	-10.4	+21 23.4		14	54.0	+ 2 16.7	-0.0498	0.5573	-0.1140	+37	2	
56	Geminorum	5.2	6.17	11.7	20 35.9		20	14.8	+ 7 26.5	+0.1639	0.5538	0.1240	+50	2	
149 B.	Geminorum	6.4	6.19	12.4	21 41.9		22	28.1	+ 9 35.3	-1.3002	0.5523	0.1280	-59	2	
61	Geminorum	5.8	6.15	12.4	20 25.3		22	31.2	+ 9 38.2	+0.0680	0.5523	0.1281	+44	2	
63	Geminorum	5.3	6.20	12.6	21 36.8		22	52.2	+ 9 58.6	-1.2590	0.5521	0.1287	-47	2	
79	Geminorum	6.3	+6.11	-14.9	+20 30.7	29	6	55.2	- 6 14.6	-1.1699	0.5466	-0.1426	-34	2	
g	Geminorum	5.0	6.03	14.9	18 42.6		7	21.2	- 5 46.6	+0.7067	0.5463	0.1433	+90	2	
209 B.	Geminorum	6.2	6.05	15.7	19 32.1		10	6.8	- 3 9.2	-0.5786	0.5444	0.1477	+ 8	2	
3	Cancr	5.7	5.95	16.6	17 31.9		14	19.0	+ 0 54.7	+0.9518	0.5416	0.1542	+90	2	
10 H.	Cancr	6.1	5.99	17.4	19 4.4		16	10.8	+ 2 43.0	-1.0057	0.5404	0.1570	-19	2	
e	Cancr (mean)	4.7	+5.93	-18.3	+17 53.6		19	45.9	+ 6 11.0	-0.3014	0.5379	-0.1621	+23	2	
d <sup>2</sup>	Cancr	6.2	5.84	19.9	17 18.9	30	2	23.3	-11 24.1	-0.7783	0.5334	0.1711	- 3	2	
90 B.	Cancr	6.3	5.75	20.7	15 35.7		7	28.0	- 6 29.0	+0.2069	0.5301	0.1774	+52	2	
54	Cancr	6.3	5.68	22.3	15 39.2		14	54.4	+ 0 43.7	-1.2088	0.5254	0.1858	-35	2	
209 B.	Cancr	6.5	5.50	23.7	11 53.8	31	0	29.3	+10 1.4	+1.0708	0.5197	0.1953	+90	2	
222 B.	Cancr	6.3	+5.47	-24.4	+11 50.6		4	39.8	- 9 55.5	+0.3076	0.5174	-0.1989	+58	2	
e	Leonis	5.1	5.39	25.7	11 39.7		12	1.5	- 2 46.7	-0.9796	0.5135	0.2047	-15	2	
h	Leonis	5.2	5.36	25.3	10 4.5		12	2.7	- 2 45.5	+0.7579	0.5135	0.2047	+90	2	
o	Leonis	3.8	+5.31	-26.1	+10 15.8		16	54.3	+ 1 57.7	-0.4515	0.5111	-0.2080	+16	2	

## OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSSION.				EMERSION.				Duration of Occultation.
			Washington.		Angle from—		Washington.		Angle from—		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	
			h m	h m	°	°	h m	h m	°	°	h m
Jan. 3	66 Arietis	6.1	23 7	4 16	108	165	0 6	5 14	207	260	0 59
3	23 Tauri	4.3	10 0	15 6	12	320	10 13	15 20	345	294	0 19
6	5 Geminorum	5.9	23 48	4 44	152	204	0 13	5 9	202	256	0 25
7	44 Geminorum	5.9	0 29	5 21	125	177	1 19	6 12	240	295	0 50
7	δ Geminorum	3.5	9 48	14 39	106	51	11 2	15 53	302	244	1 14
7	149 B. Geminorum	6.4	13 43	18 33	45	353	14 6	18 56	354	304	0 23
7	63 Geminorum	5.3	14 4	18 55	52	1	14 33	19 23	346	298	0 28
8	85 Geminorum	5.2	0 43	5 32	91	140	1 41	6 29	285	338	0 57
8	217 B. Geminorum	6.3	3 23	8 11	57	113	4 16	9 3	328	24	0 52
9	54 Cancri	6.3	5 37	10 21	169	220	6 23	11 6	236	283	0 45
10	ξ Leonis	5.1	2 57	7 38	165	216	3 29	8 10	231	283	0 32
11	155 B. Leonis	6.5	7 24	11 59	141	185	8 43	13 18	286	317	1 19
14	γ Virginis	5.3	6 31	10 55	88	140	7 23	11 47	330	19	0 52
18	85 B. Scorp̄ii	6.0	11 8	15 16	71	120	11 58	16 5	322	6	0 50
26	19 Piscium	5.4	2 48	6 25	70	26	3 52	7 30	229	180	1 5
29	26 Arietis	6.2	7 12	10 37	55	359	8 11	11 35	283	229	0 58
30	66 Arietis	6.1	9 18	12 39	124	70	10 4	13 24	229	178	0 45
Feb. 2	5 Geminorum	5.9	10 16	13 24	158	99	10 58	14 6	234	176	0 42
3	87 B. Geminorum	5.8	2 7	5 13	60	118	3 9	6 15	305	4	1 2
3	44 Geminorum	5.9	11 0	14 4	104	45	12 5	15 9	298	242	1 5
4	85 Geminorum	5.2	11 28	14 28	52	356	11 57	14 58	1	305	0 29
6	ξ Leonis	5.1	13 31	16 23	57	4	14 0	16 52	4	311	0 29
14	3 Scorp̄ii	5.9	13 42	16 3	136	162	14 54	17 14	260	273	1 11
25	47 B. Arietis	6.5	6 59	8 37	46	351	7 52	9 30	286	233	0 53
26	ε Arietis (mean)	4.6	4 51	6 26	106	56	6 1	7 36	228	172	1 10
27	36 Tauri	5.6	9 58	11 28	88	34	10 54	12 24	273	223	0 56
28	k Tauri	5.6	9 26	10 52	118	60	10 26	11 52	256	200	1 0
Mar. 6	83 B. Leonis	5.9	9 17	10 20	80	93	10 17	11 20	354	344	1 0
6	89 B. Leonis	6.2	11 9	12 11	141	114	12 28	13 31	292	249	1 20
6	π Leonis	4.9	12 42	13 44	119	74	13 55	14 57	307	256	1 13
10	370 B. Virginis	6.0	8 45	9 32	111	156	9 54	10 41	315	352	1 9
12	9 G. Libræ	6.5	9 36	10 16	103	152	10 39	11 18	309	352	1 2
25	μ Arietis	5.7	9 31	9 19	80	31	10 22	10 10	263	218	0 51
28	118 Tauri	5.4	8 36	8 13	54	354	9 26	9 3	327	268	0 50
31	10 H. Cancri	6.1	7 53	7 18	136	140	9 19	8 44	278	240	1 26
Apr. 1	54 Cancri	6.3	6 38	5 59	100	146	8 4	7 25	315	335	1 26
2	o Leonis	3.8	11 10	10 27	164	132	12 15	11 31	267	222	1 4
3	155 B. Leonis	6.5	8 29	7 42	113	147	9 54	9 6	319	328	1 24
10	σ Scorp̄ii	3.1	16 9	14 53	116	117	17 31	16 15	260	244	1 22
12	70 B. Sagittarii	6.4	16 2	14 38	22	49	16 36	15 13	331	352	0 35
14	δ Capricorni	5.5	15 36	14 4	113	161	16 29	14 58	218	260	0 53
27	209 B. Geminorum	6.2	12 42	10 20	80	25	13 33	11 11	326	272	0 51
May 7	31 B. Scorp̄ii	5.4	12 33	9 32	119	157	13 45	10 43	277	303	1 11
7	40 B. Scorp̄ii	5.4	15 14	12 12	113	122	16 38	13 36	272	262	1 23
7	50 B. Scorp̄ii	6.4	18 36	15 33	45	14	19 26	16 24	319	280	0 51
10	191 B. Sagittarii	6.5	18 47	15 32	90	94	20 4	16 49	233	220	1 17
30	64 B. Virginis	6.5	17 38	13 5	136	86	18 33	14 0	267	215	0 55
June 3	42 Libræ	5.0	20 7	15 18	13	327	20 19	15 30	352	305	0 12

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.  
† Immersion below the horizon of Washington. ‡ Emersion below the horizon of Washington.



## OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Duration of Occultation.
			Washington.		Angle from—		Washington.		Angle from—		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	
			h m	h m	°	°	h m	h m	°	°	h m
June 11	22 B. Piscium	6.4	17 28	12 8	103	154	18 13	12 53	204	255	0 45
11	9 Piscium	6.4	19 41	14 21	35	81	20 44	15 23	261	300	1 3
11	κ Piscium	4.9	20 5	14 45	341	25	20 20	15 0	316	358	0 15
15	47 Arietis	5.8	20 10	14 34	51	101	21 0	15 24	270	324	0 50
25	p <sup>a</sup> Leonis	6.1	14 20	8 6	120	76	15 32	9 18	301	252	1 12
26	13 B. Virginis	† 5.9	17 2	10 43	56	6	17 36	11 17	351	300	0 33
July 1	50 B. Scorpii	6.4	15 56	9 18	26	27	16 20	9 41	354	350	0 23
3	70 B. Sagittarii	6.4	22 13	15 26	154	112	22 24	15 36	173	129	0 10
4	222 B. Sagittarii	5.5	19 38	12 48	80	75	20 53	14 2	238	217	1 15
4	50 Sagittarii	5.5	22 47	15 56	66	27	23 49	16 57	249	202	1 1
27	18 G. Libræ	† 6.1	19 16	10 55	59	13	20 7	11 46	317	266	0 50
Aug. 5	16 Piscium	5.7	17 43	8 47	26	77	18 27	9 30	282	333	0 43
5	19 Piscium	5.4	23 16	14 19	53	62	0 32	15 34	235	219	1 15
6	136 B. Piscium	6.5	23 32	14 30	95	119	0 31	15 30	196	199	1 0
7	101 Piscium	6.2	23 35	14 30	94	136	0 38	15 33	203	227	1 3
10	62 Tauri	6.1	0 30	15 13	19	78	1 9	15 52	311	9	0 39
12	8 Geminorum	6.1	1 26	16 1	27	84	1 59	16 34	329	28	0 33
12	9 Geminorum	6.2	1 26	16 2	91	149	2 38	17 13	266	325	1 11
28	222 B. Sagittarii	5.5	20 18	9 51	116	102	21 8	10 41	200	176	0 50
28	50 Sagittarii	† 5.5	23 18	12 51	99	56	0 9	13 42	217	169	0 51
30	72 B. Aquarii	6.5	1 37	15 2	342	297	1 50	15 14	319	272	0 12
Sept. 1	κ Piscium	4.9	4 2	17 18	98	48	4 49	18 5	210	159	0 47
4	20 H <sup>1</sup> Arietis	6.4	0 28	13 32	109	149	1 21	14 26	195	216	0 53
6	33 Tauri	6.0	21 26	10 24	6	58	21 46	10 43	323	17	0 19
6	161 B. Tauri	6.5	22 41	11 38	68	124	23 43	12 40	258	317	1 2
7	99 Tauri	6.0	22 54	11 47	148	202	23 16	12 9	191	247	0 22
23	63 Ophiuchi	6.1	19 47	7 38	54	30	20 57	8 48	282	246	1 10
24	154 B. Sagittarii	5.9	20 38	8 24	87	64	21 48	9 35	233	199	1 11
26	95 B. Capricorni	5.9	0 20	11 58	42	2	1 19	12 57	260	214	0 59
29	16 Piscium	5.7	18 46	6 13	356	46	19 9	6 37	309	358	0 23
29	19 Piscium	5.4	0 17	11 44	44	33	1 29	12 56	247	216	1 12
30	136 B. Piscium	6.5	23 22	10 44	42	68	0 33	11 56	251	253	1 12
Oct. 4	95 Tauri	6.2	3 30	14 36	85	126	4 57	16 3	262	248	1 27
5	121 Tauri	5.1	0 27	11 30	72	129	1 31	12 34	275	334	1 5
7	56 Geminorum	† 5.2	0 0	10 55	122	170	0 49	11 44	247	299	0 49
7	61 Geminorum	5.8	2 27	13 22	142	198	3 16	14 11	232	288	0 49
21	24 Sagittarii	5.7	18 52	4 53	141	136	19 26	5 27	190	177	0 35
21	117 B. Sagittarii	5.8	21 25	7 26	83	50	22 32	8 33	240	197	1 7
23	47 B. Capricorni	6.2	23 5	8 57	87	55	0 5	9 57	216	175	1 0
24	72 B. Aquarii	6.5	22 0	7 49	16	7	22 58	8 47	279	256	0 58
26	κ Piscium	4.9	4 27	14 7	149	99	4 32	14 12	160	109	0 5
29	20 H <sup>1</sup> Arietis	6.4	0 47	10 15	64	98	2 4	11 33	243	243	1 17
Nov. 2	1 Geminorum	4.3	23 36	8 49	81	133	0 34	9 46	273	329	0 57
2	3 Geminorum	5.6	2 19	11 32	130	188	3 17	12 29	229	286	0 57
3	120 B. Geminorum	6.5	5 27	14 35	69	115	6 41	15 49	320	336	1 13
10	q Virginis	† 5.3	6 54	15 35	110	162	7 57	16 37	305	353	1 2
24	136 B. Piscium	6.5	20 45	4 32	32	82	21 43	5 30	267	313	0 58
27	32 Tauri	5.8	9 56	17 29	144	91	10 28	18 0	216	164	0 32

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.  
† Immersion below the horizon of Washington. ‡ Emersion below the horizon of Washington.

## OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	THE STAR'S		IMMERSION.				EMERSION.				Duration of Occultation.
			Washington.		Angle from—		Washington.		Angle from—		
	Name.	Mag.	Sidereal Time.	Mean Time.	North Point.	Vertex.	Sidereal Time.	Mean Time.	North Point.	Vertex.	
			h m	h m	°	°	h m	h m	°	°	h m
Nov. 28	284 B. Tauri	6.0	23 8	6 38	114	170	23 56	7 27	221	278	0 48
28	300 B. Tauri	6.2	4 15	11 45	154	172	4 47	12 17	197	193	0 31
30	d Geminorum	5.2	9 56	17 17	66	10	10 46	18 8	333	276	0 50
Dec. 1	g Geminorum	5.0	10 56	18 13	135	81	12 1	19 18	274	218	1 5
3	B. Cancri	6.3	6 22	13 32	120	168	7 47	14 57	294	327	1 25
5	237 B. Leonis	6.3	11 23	18 24	162	151	12 35	19 36	271	241	1 11
6	e Leonis	5.1	7 9	14 7	182	230	7 41	14 39	237	283	0 32
22	101 Piscium	6.2	7 23	13 18	103	51	8 12	14 7	228	178	0 49
24	ζ Arietis	5.0	23 30	5 18	87	144	0 36	6 25	230	283	1 7
27	3 Geminorum	5.6	23 58	5 34	69	122	0 54	6 30	286	343	0 56
27	6 Geminorum	6.3	1 9	6 45	120	177	2 6	7 42	237	295	0 57
27	μ Geminorum	3.2	8 3	13 39	178	130	8 27	14 3	212	160	0 24

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.

FOR GREENWICH MEAN NOON.

Date.	$P$	$B_0$	$L_0$	Date.	$P$	$B_0$	$L_0$
Jan. 1	+ 1.99	-3.16	162.77	July 5	- 0.88	+3.42	240.96
6	- 0.44	3.73	96.92	10	+ 1.39	3.94	174.79
11	2.86	4.27	31.07	15	3.64	4.43	108.62
16	5.23	4.77	325.24	20	5.85	4.90	42.47
21	7.54	5.24	259.40	25	8.00	5.32	336.32
26	- 9.76	-5.66	193.57	30	+10.07	+5.72	270.18
31	11.89	6.04	127.74	Aug. 4	12.06	6.07	204.06
Feb. 5	13.90	6.37	61.90	9	13.96	6.38	137.94
10	15.79	6.65	356.07	14	15.75	6.64	71.84
15	17.54	6.88	290.23	19	17.42	6.86	5.76
20	-19.15	-7.05	224.39	24	+18.98	+7.04	299.69
25	20.62	7.17	158.54	29	20.40	7.16	233.63
Mar. 2	21.93	7.24	92.67	Sept. 3	21.69	7.23	167.58
7	23.08	7.25	26.80	8	22.84	7.25	101.55
12	24.07	7.20	320.91	13	23.84	7.22	35.53
17	-24.89	-7.10	255.00	18	+24.68	+7.13	329.53
22	25.54	6.94	189.08	23	25.37	6.99	263.53
27	26.01	6.74	123.15	28	25.89	6.80	197.55
Apr. 1	26.31	6.48	57.19	Oct. 3	26.24	6.56	131.57
6	26.43	6.18	351.21	8	26.41	6.27	65.60
11	-26.36	-5.83	285.21	13	+26.40	+5.94	359.64
16	26.11	5.44	219.19	18	26.20	5.55	293.69
21	25.68	5.01	153.16	23	25.81	5.13	227.75
26	25.06	4.55	87.10	28	25.23	4.66	161.81
May 1	24.26	4.06	21.02	Nov. 2	24.45	4.16	95.88
6	-23.28	-3.53	314.93	7	+23.47	+3.63	29.95
11	22.13	2.99	248.81	12	22.29	3.07	324.04
16	20.80	2.42	182.69	17	20.93	2.48	258.12
21	19.31	1.84	116.55	22	19.38	1.87	192.22
26	17.67	1.25	50.39	27	17.65	1.25	126.32
31	-15.88	-0.65	344.23	Dec. 2	+15.76	+0.61	60.42
June 5	13.98	-0.05	278.06	7	13.73	-0.03	354.53
10	11.96	+0.55	211.88	12	11.56	0.67	288.65
15	9.85	1.15	145.69	17	9.30	1.29	222.78
20	7.66	1.74	79.51	22	6.95	1.93	156.92
25	- 5.43	+2.32	13.33	27	+ 4.55	-2.54	91.05
30	- 3.16	+2.88	307.14	32	+ 2.11	-3.13	25.20

In the above table,  $P$  is the position-angle of the axis of rotation measured eastward from the north point of the disk, while  $L_0$  and  $B_0$  are the heliographic longitudes and latitudes, respectively, of the center of the disk. The longitudes are reckoned from the Solar Meridian which passed through the ascending node of the Sun's equator on the ecliptic, on January 1, 1854, Greenwich Mean Noon.

## MEAN EQUATOR, ORBIT, AND MEAN LONGITUDE.

FOR GREENWICH MEAN NOON.

Date.	Mean Equator.			Orbit.		Mean Longitude. C	Mean Solar Days.	Motion in Mean Longitude.
	i	A	Ω'	Γ'	Ω			
	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "		° ' "
Jan. 0	22 57.5	107 0.1	3 41.4	306 2.1	290 23.4	2 41.7	0.1	1 19.06
10	22 58.3	106 27.8	3 42.1	307 8.9	289 51.6	134 27.5	0.2	2 38.12
20	22 59.1	105 55.4	3 42.7	308 15.7	289 19.8	266 13.4	0.3	3 57.18
30	22 59.9	105 23.2	3 43.3	309 22.6	288 48.0	37 59.2	0.4	5 16.23
Feb. 9	23 0.7	104 50.9	3 43.8	310 29.4	288 16.3	169 45.1	0.5	6 35.29
							0.6	7 54.35
19	23 1.6	104 18.6	3 44.4	311 36.3	287 44.5	301 30.9	0.7	9 13.41
Mar. 1	23 2.4	103 46.4	3 44.9	312 43.1	287 12.7	73 16.7	0.8	10 32.47
11	23 3.2	103 14.1	3 45.4	313 50.0	286 40.9	205 2.6	0.9	11 51.53
21	23 4.0	102 41.9	3 45.9	314 56.8	286 9.2	336 48.4	1.0	13 10.58
31	23 4.9	102 9.7	3 46.4	316 3.6	285 37.4	108 34.2	2.0	26 21.17
							3.0	39 31.75
Apr. 10	23 5.7	101 37.5	3 46.8	317 10.5	285 5.6	240 20.1	4.0	52 42.33
20	23 6.5	101 5.4	3 47.2	318 17.3	284 33.9	12 5.9	5.0	65 52.92
30	23 7.4	100 33.2	3 47.7	319 24.2	284 2.1	143 51.8	6.0	79 3.50
May 10	23 8.2	100 1.1	3 48.0	320 31.0	283 30.3	275 37.6	7.0	92 14.09
20	23 9.0	99 29.0	3 48.4	321 37.9	282 58.5	47 23.4	8.0	105 24.67
							9.0	118 35.25
30	23 9.9	98 56.9	3 48.8	322 44.7	282 26.8	179 9.3	10.0	131 45.84
June 9	23 10.7	98 24.9	3 49.1	323 51.5	281 55.0	310 55.1		
19	23 11.6	97 52.8	3 49.4	324 58.4	281 23.2	82 41.0		
29	23 12.4	97 20.8	3 49.7	326 5.2	280 51.5	214 26.8		
July 9	23 13.3	96 48.8	3 49.9	327 12.1	280 19.7	346 12.6		
							Hours.	° ' "
19	23 14.1	96 16.8	3 50.2	328 18.9	279 47.9	117 58.5	1	0 32.94
29	23 15.0	95 44.9	3 50.4	329 25.7	279 16.1	249 44.3	2	1 5.88
Aug. 8	23 15.8	95 12.9	3 50.6	330 32.6	278 44.4	21 30.1	3	1 38.82
18	23 16.6	94 41.0	3 50.8	331 39.4	278 12.6	153 16.0	4	2 11.76
28	23 17.5	94 9.1	3 51.0	332 46.3	277 40.8	285 1.8	5	2 44.70
							6	3 17.65
Sept. 7	23 18.4	93 37.2	3 51.1	333 53.1	277 9.0	56 47.7	7	3 50.59
17	23 19.2	93 5.3	3 51.2	335 0.0	276 37.3	188 33.5	8	4 23.53
27	23 20.0	92 33.4	3 51.4	336 6.8	276 5.5	320 19.3	9	4 56.47
Oct. 7	23 20.9	92 1.6	3 51.4	337 13.6	275 33.7	92 5.2	10	5 29.41
17	23 21.8	91 29.8	3 51.5	338 20.5	275 2.0	223 51.0	11	6 2.35
							12	6 35.29
27	23 22.6	90 57.9	3 51.6	339 27.3	274 30.2	355 36.8	13	7 8.23
Nov. 6	23 23.4	90 26.2	3 51.6	340 34.2	273 58.4	127 22.7	14	7 41.17
16	23 24.3	89 54.4	3 51.6	341 41.0	273 26.6	259 8.5	15	8 14.11
26	23 25.2	89 22.6	3 51.6	342 47.9	272 54.9	30 54.4	16	8 47.06
Dec. 6	23 26.0	88 50.9	3 51.5	343 54.7	272 23.1	162 40.2	17	9 20.00
							18	9 52.94
16	23 26.9	88 19.2	3 51.5	345 1.5	271 51.3	294 26.0	19	10 25.88
26	23 27.7	87 47.5	3 51.4	346 8.4	271 19.5	66 11.9	20	10 58.82
36	23 28.6	87 15.9	3 51.3	347 15.2	270 47.8	197 57.7	21	11 31.76
							22	12 4.70
							23	12 37.64

Daily motion of  $\Gamma'$  . . . . . +6'.684Daily motion of  $\Omega$  . . . . . -3'.177

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

FOR GREENWICH MEAN MIDNIGHT.

Date.		The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	
Jan.	1	+6.98	—6.72	0.00	+0.01	11.56	—0.24	338.58
	2	6.75	6.30	0.00	0.01	23.70	0.22	341.13
	3	6.24	5.59	0.00	0.01	35.84	0.19	344.71
	4	5.50	4.61	0.00	0.01	47.98	0.16	349.13
	5	4.53	3.44	0.00	0.01	60.11	0.13	354.10
	6	+3.41	—2.13	0.00	+0.01	72.24	—0.10	359.28
	7	2.16	—0.73	0.00	0.01	84.38	0.07	4.34
	8	+0.82	+0.69	0.00	0.01	96.50	0.04	9.01
	9	—0.57	2.07	0.00	0.01	108.64	—0.01	13.14
	10	1.98	3.36	—0.01	0.01	120.77	+0.02	16.61
	11	—3.34	+4.51	—0.01	+0.01	132.90	+0.05	19.39
	12	4.62	5.48	0.01	0.01	145.04	0.08	21.44
	13	5.76	6.21	0.01	0.01	157.18	0.10	22.71
	14	6.68	6.68	0.01	0.01	169.33	0.13	23.12
	15	7.34	6.84	0.01	0.01	181.48	0.15	22.57
	16	—7.67	+6.68	—0.01	+0.01	193.64	+0.18	20.91
	17	7.62	6.16	0.01	0.01	205.81	0.20	18.02
	18	7.14	5.29	0.01	0.01	217.99	0.23	13.83
	19	6.23	4.07	0.01	0.01	230.17	0.25	8.48
	20	4.91	2.56	0.01	0.01	242.36	0.28	2.35
	21	—3.23	+0.84	—0.01	+0.01	254.55	+0.31	356.01
	22	—1.31	—0.96	0.01	0.01	266.74	0.34	350.08
	23	+0.72	2.70	0.01	0.01	278.93	0.36	345.03
	24	2.70	4.25	0.01	0.01	291.12	0.39	341.12
	25	4.48	5.48	0.01	0.01	303.32	0.42	338.45
	26	+5.93	—6.31	—0.01	+0.01	315.50	+0.46	337.05
	27	6.97	6.74	0.01	0.01	327.68	0.48	336.92
	28	7.55	6.76	0.01	0.01	339.85	0.51	338.03
	29	7.68	6.40	0.01	0.01	352.02	0.54	340.34
	30	7.40	5.74	0.01	0.01	4.18	0.57	343.72
	31	+6.76	—4.81	—0.01	+0.01	16.33	+0.60	347.98
Feb.	1	5.83	3.68	0.01	0.01	28.48	0.63	352.85
	2	4.68	2.40	0.01	0.01	40.63	0.66	357.99
	3	3.38	—1.04	0.01	0.01	52.77	0.69	3.08
	4	2.01	+0.37	0.01	0.02	64.91	0.72	7.86
	5	+0.60	+1.75	—0.01	+0.02	77.05	+0.75	12.14
	6	—0.80	3.05	0.01	0.02	89.18	0.77	15.80
	7	2.14	4.23	0.01	0.02	101.32	0.80	18.77
	8	3.40	5.23	0.02	0.02	113.46	0.82	21.02
	9	4.55	6.01	0.02	0.02	125.59	0.84	22.50
	10	—5.55	+6.52	—0.02	+0.02	137.73	+0.86	23.14
	11	6.37	6.74	0.02	0.02	149.88	0.88	22.84
	12	6.98	6.65	0.02	0.02	162.03	0.90	21.51
	13	7.33	6.23	0.02	0.02	174.19	0.92	19.03
	14	7.38	5.48	0.02	0.02	186.36	0.93	15.35
	15	—7.10	+4.41	—0.02	+0.02	198.53	+0.95	10.54
	16	—6.44	+3.06	—0.02	+0.02	210.71	+0.97	4.84

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

## FOR GREENWICH MEAN MIDNIGHT

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	"	"	"	"	"	"	"
Feb. 16	-6.44	+3.06	-0.02	+0.02	210.71	+0.97	4.84
17	5.40	+1.49	0.02	0.02	222.89	0.98	358.71
18	3.98	-0.22	0.02	0.02	235.08	1.00	352.69
19	2.24	1.95	0.02	0.02	247.28	1.02	347.28
20	-0.30	3.56	0.01	0.02	259.48	1.04	342.82
21	+1.71	-4.92	-0.01	+0.02	271.68	+1.07	339.52
22	3.62	5.92	0.01	0.02	283.89	1.09	337.49
23	5.25	6.50	0.01	0.02	296.09	1.11	336.79
24	6.50	6.66	0.01	0.02	308.29	1.13	337.43
25	7.26	6.40	0.01	0.02	320.48	1.16	339.37
26	+7.52	-5.80	-0.01	+0.02	332.67	+1.18	342.51
27	7.30	4.92	0.01	0.02	344.85	1.20	346.63
28	6.67	3.82	0.01	0.02	357.02	1.23	351.44
Mar. 1	5.71	2.57	0.01	0.02	9.20	1.25	356.60
2	4.51	-1.23	0.01	0.02	21.36	1.27	1.76
3	+3.15	+0.15	-0.02	+0.02	33.52	+1.29	6.64
4	1.73	1.51	0.02	0.02	45.68	1.31	11.07
5	+0.30	2.81	0.02	0.02	57.83	1.33	14.90
6	-1.05	3.98	0.02	0.02	69.98	1.35	18.08
7	2.29	5.00	0.02	0.02	82.13	1.36	20.54
8	-3.39	+5.79	-0.02	+0.02	94.28	+1.38	22.24
9	4.33	6.34	0.02	0.02	106.42	1.39	23.10
10	5.10	6.59	0.02	0.02	118.57	1.40	23.03
11	5.69	6.54	0.02	0.02	130.73	1.40	21.94
12	6.10	6.16	0.02	0.02	142.88	1.40	19.72
13	-6.31	+5.46	-0.02	+0.02	155.05	+1.41	16.34
14	6.31	4.47	0.02	0.02	167.22	1.41	11.86
15	6.07	3.21	0.02	0.02	179.39	1.42	6.49
16	5.57	1.74	0.02	0.02	191.57	1.42	0.62
17	4.76	+0.14	0.02	0.02	203.76	1.42	354.71
18	-3.65	-1.50	-0.02	+0.02	215.96	+1.43	349.22
19	2.26	3.08	0.02	0.02	228.16	1.43	344.50
20	-0.64	4.46	0.02	0.02	240.37	1.44	340.78
21	+1.10	5.54	0.02	0.02	252.58	1.45	338.21
22	2.81	6.25	0.02	0.02	264.80	1.46	336.91
23	+4.35	-6.53	-0.02	+0.02	277.02	+1.47	336.95
24	5.56	6.39	0.02	0.02	289.24	1.48	338.36
25	6.36	5.87	0.02	0.02	301.45	1.49	341.09
26	6.67	5.03	0.02	0.02	313.66	1.50	344.96
27	6.52	3.95	0.02	0.02	325.86	1.51	349.68
28	+5.95	-2.70	-0.02	+0.02	338.07	+1.52	354.87
29	5.02	-1.35	0.02	0.02	350.26	1.53	0.15
30	3.84	+0.03	0.02	0.02	2.45	1.54	5.21
31	2.50	1.38	0.02	0.02	14.63	1.55	9.82
Apr. 1	+1.09	2.67	0.02	0.02	26.81	1.56	13.85
2	-0.29	+3.84	-0.02	+0.02	38.99	+1.57	17.23
3	-1.58	+4.86	-0.02	+0.02	51.16	+1.57	19.82

**EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.**  
**FOR GREENWICH MEAN MIDNIGHT.**

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	°	°	°	°	°	°	°
Apr. 1	+1.09	+2.67	-0.02	+0.02	26.81	+1.56	13.85
2	-0.29	3.84	0.02	0.02	38.99	1.57	17.23
3	1.58	4.86	0.02	0.02	51.16	1.57	19.92
4	2.71	5.68	0.02	0.02	63.33	1.58	21.86
5	3.64	6.24	0.02	0.02	75.50	1.58	22.98
6	-4.35	+6.53	-0.02	+0.02	87.66	+1.57	23.19
7	4.84	6.50	0.03	0.02	99.82	1.57	22.37
8	5.12	6.14	0.03	0.02	111.99	1.56	20.42
9	5.20	5.46	0.03	0.02	124.15	1.55	17.27
10	5.12	4.48	0.03	0.02	136.32	1.54	12.98
11	-4.88	+3.24	-0.02	+0.02	148.50	+1.53	7.76
12	4.48	1.80	0.02	0.02	160.68	1.51	1.99
13	3.91	+0.23	0.02	0.02	172.86	1.50	356.12
14	3.17	-1.36	0.02	0.02	185.06	1.49	350.60
15	2.24	2.90	0.02	0.02	197.26	1.48	345.76
16	-1.13	-4.26	-0.02	+0.02	209.47	+1.47	341.83
17	+0.13	5.37	0.02	0.02	221.69	1.46	338.94
18	1.46	6.14	0.02	0.02	233.91	1.45	337.21
19	2.77	6.50	0.02	0.02	246.14	1.45	336.73
20	3.94	6.46	0.02	0.02	258.37	1.44	337.58
21	+4.87	-6.02	-0.02	+0.02	270.60	+1.44	339.79
22	5.46	5.24	0.02	0.02	282.84	1.44	343.25
23	5.66	4.18	0.02	0.02	295.07	1.43	347.73
24	5.45	2.93	0.02	0.02	307.30	1.43	352.87
25	4.86	1.57	0.02	0.02	319.52	1.43	358.25
26	+3.95	-0.16	-0.02	+0.02	331.74	+1.42	3.49
27	2.80	+1.23	0.02	0.02	343.95	1.42	8.33
28	1.50	2.55	0.02	0.02	356.16	1.42	12.60
29	+0.13	3.76	0.02	0.02	8.37	1.42	16.22
30	-1.21	4.80	0.02	0.02	20.56	1.41	19.14
May 1	-2.44	+5.65	-0.02	+0.02	32.76	+1.40	21.34
2	3.48	6.25	0.02	0.03	44.95	1.40	22.74
3	4.27	6.58	0.02	0.03	57.13	1.39	23.27
4	4.80	6.60	0.02	0.03	69.32	1.37	22.81
5	5.04	6.29	0.02	0.03	81.50	1.36	21.22
6	-5.02	+5.65	-0.02	+0.03	93.67	+1.34	18.40
7	4.75	4.68	0.02	0.03	105.85	1.32	14.36
8	4.28	3.43	0.02	0.03	118.03	1.29	9.26
9	3.66	1.96	0.02	0.02	130.21	1.26	3.47
10	2.92	+0.36	0.02	0.02	142.40	1.24	357.49
11	-2.08	-1.27	-0.02	+0.02	154.59	+1.21	351.80
12	1.18	2.83	0.02	0.02	166.79	1.19	346.78
13	-0.22	4.22	0.02	0.02	179.00	1.16	342.65
14	+0.78	5.35	0.02	0.02	191.21	1.14	339.53
15	1.78	6.16	0.01	0.02	203.44	1.11	337.52
16	+2.75	-6.58	-0.01	+0.02	215.66	+1.09	336.69
17	+3.62	-6.61	-0.01	+0.02	227.90	+1.08	337.12



## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

FOR GREENWICH MEAN MIDNIGHT.

Date.		The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
		Long.	Lat.	Long.	Lat.	Colong.	Lat.	
		"	"	"	"	"	"	"
May	17	+3.62	-6.61	-0.01	+0.02	227.90	+1.08	337.12
	18	4.34	6.25	0.01	0.02	240.14	1.06	338.84
	19	4.83	5.53	0.01	0.02	252.38	1.04	341.85
	20	5.04	4.52	0.01	0.02	264.62	1.03	345.97
	21	4.95	3.28	0.01	0.02	276.87	1.01	350.91
	22	+4.54	-1.91	-0.01	+0.02	289.12	+1.00	356.27
	23	3.84	-0.46	0.01	0.03	301.36	0.98	1.65
	24	2.87	+0.97	0.01	0.03	313.60	0.97	6.70
	25	1.71	2.35	0.01	0.03	325.83	0.96	11.22
	26	+0.41	3.61	0.02	0.03	338.06	0.95	15.09
	27	-0.93	+4.70	-0.02	+0.03	350.29	+0.93	18.26
	28	2.24	5.61	0.02	0.03	2.51	0.92	20.71
	29	3.44	6.27	0.02	0.03	14.72	0.90	22.39
	30	4.44	6.67	0.02	0.03	26.93	0.89	23.24
	31	5.18	6.77	0.02	0.03	39.14	0.87	23.15
June	1	-5.62	+6.54	-0.02	+0.03	51.33	+0.85	21.99
	2	5.72	5.98	0.02	0.03	63.53	0.82	19.64
	3	5.48	5.08	0.02	0.03	75.72	0.80	16.02
	4	4.93	3.86	0.02	0.03	87.90	0.77	11.20
	5	4.10	2.40	0.02	0.03	100.09	0.74	5.49
	6	-3.07	+0.76	-0.02	+0.03	112.28	+0.70	359.35
	7	1.89	-0.95	0.01	0.03	124.47	0.67	353.39
	8	-0.65	2.59	0.01	0.03	136.67	0.63	348.02
	9	+0.60	4.08	0.01	0.03	148.87	0.60	343.54
	10	1.78	5.29	0.01	0.03	161.08	0.56	340.13
	11	+2.86	-6.16	-0.01	+0.03	173.29	+0.53	337.84
	12	3.79	6.66	0.01	0.03	185.51	0.50	336.73
	13	4.53	6.75	0.01	0.03	197.74	0.47	336.85
	14	5.06	6.46	0.01	0.03	209.97	0.44	338.23
	15	5.36	5.81	0.01	0.03	222.21	0.42	340.86
	16	+5.41	-4.86	-0.01	+0.03	234.46	+0.39	344.63
	17	5.21	3.67	0.01	0.03	246.71	0.37	349.31
	18	4.76	2.31	0.01	0.03	258.96	0.34	354.54
	19	4.08	-0.86	0.01	0.03	271.21	0.32	359.92
	20	3.18	+0.60	0.01	0.03	283.46	0.30	5.11
	21	+2.09	+2.02	-0.01	+0.03	295.71	+0.28	9.83
	22	+0.86	3.33	0.01	0.03	307.96	0.27	13.94
	23	-0.45	4.49	0.01	0.03	320.20	0.25	17.35
	24	1.79	5.46	0.01	0.03	332.44	0.23	20.03
	25	3.10	6.19	0.01	0.03	344.68	0.22	21.96
	26	-4.29	+6.66	-0.01	+0.03	356.90	+0.20	23.09
	27	5.30	6.85	0.01	0.03	9.13	0.18	23.34
	28	6.07	6.73	0.01	0.03	21.34	0.16	22.59
	29	6.52	6.28	0.01	0.03	33.56	0.13	20.73
	30	6.61	5.50	0.01	0.03	45.76	0.11	17.64
July	1	-6.32	+4.40	-0.01	+0.03	57.96	+0.08	13.32
	2	-5.63	+3.01	-0.01	+0.03	70.16	+0.05	7.93

**EPIHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.**  
**FOR GREENWICH MEAN MIDNIGHT.**

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	°	°	°	°	°	°	°
July 1	-6.32	+4.40	-0.01	+0.03	57.96	+0.08	13.32
2	5.63	3.01	0.01	0.03	70.16	0.05	7.93
3	4.58	+1.40	0.01	0.03	82.35	+0.01	1.86
4	3.22	-0.33	0.01	0.03	94.54	-0.02	355.85
5	-1.65	2.06	-0.01	0.03	106.73	0.06	349.87
6	+0.03	-3.66	0.00	+0.03	118.92	-0.10	344.91
7	1.69	5.01	0.00	0.03	131.12	0.13	341.02
8	3.22	6.01	0.00	0.03	143.32	0.17	338.32
9	4.53	6.61	0.00	0.03	155.53	0.20	336.86
10	5.54	6.79	0.00	0.03	167.74	0.23	336.67
11	+6.23	-6.57	0.00	+0.03	179.96	-0.27	337.77
12	6.58	5.98	0.00	0.03	192.19	0.30	340.13
13	6.59	5.09	0.00	0.03	204.42	0.32	343.63
14	6.31	3.95	0.00	0.03	216.66	0.35	348.08
15	5.76	2.64	0.00	0.03	228.91	0.38	353.15
16	+4.99	-1.22	0.00	+0.03	241.15	-0.40	358.48
17	4.04	+0.23	0.00	0.03	253.40	0.43	3.71
18	2.93	1.66	0.00	0.03	265.65	0.45	8.56
19	1.70	3.00	0.00	0.03	277.90	0.47	12.85
20	+0.41	4.19	0.00	0.03	290.16	0.49	16.47
21	-0.93	+5.21	0.00	+0.03	302.40	-0.51	19.37
22	2.27	6.00	0.00	0.03	314.65	0.52	21.52
23	3.56	6.53	0.00	0.03	326.89	0.54	22.88
24	4.74	6.79	0.00	0.03	339.13	0.56	23.40
25	5.78	6.76	0.00	0.03	351.36	0.58	22.98
26	-6.59	+6.41	0.00	+0.03	3.58	-0.59	21.52
27	7.11	5.75	0.00	0.03	15.80	0.61	18.93
28	7.30	4.78	0.00	0.03	28.01	0.63	15.15
29	7.08	3.53	0.00	0.03	40.22	0.66	10.26
30	6.44	2.04	0.00	0.03	52.41	0.68	4.51
31	-5.36	+0.38	0.00	+0.03	64.60	-0.71	358.35
Aug. 1	3.88	-1.35	0.00	0.03	76.79	0.74	352.31
2	2.09	3.02	0.00	0.03	88.98	0.77	346.86
3	-0.10	4.49	0.00	0.03	101.16	0.80	342.44
4	+1.92	5.64	0.00	0.03	113.35	0.83	339.17
5	+3.79	-6.39	+0.01	+0.03	125.54	-0.86	337.19
6	5.39	6.70	0.01	0.03	137.74	0.89	336.56
7	6.60	6.57	0.01	0.03	149.94	0.92	337.30
8	7.37	6.05	0.01	0.03	162.14	0.94	339.38
9	7.68	5.21	0.01	0.03	174.35	0.97	342.67
10	+7.58	-4.11	+0.01	+0.03	186.57	-0.99	346.96
11	7.11	2.84	0.01	0.03	198.80	1.02	351.93
12	6.34	1.46	0.01	0.03	211.03	1.04	357.22
13	5.35	-0.03	0.01	0.03	223.26	1.06	2.48
14	4.20	+1.38	0.01	0.03	235.50	1.08	7.42
15	+2.93	+2.71	+0.01	+0.03	247.74	-1.10	11.84
16	+1.61	+3.92	+0.01	+0.03	259.98	-1.12	15.64

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

FOR GREENWICH MEAN MIDNIGHT.

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	"	"	"	"	"	"	"
Aug. 16	+1.61	+3.92	+0.01	+0.03	259.98	-1.12	15.64
17	+0.27	4.95	0.01	0.03	272.23	1.13	18.73
18	-1.06	5.77	0.01	0.03	284.47	1.15	21.08
19	2.36	6.34	+0.01	0.03	296.71	1.16	22.65
20	3.58	6.64	0.00	0.03	308.95	1.17	23.39
21	-4.72	+6.66	0.00	+0.03	321.19	-1.18	23.21
22	5.71	6.37	0.00	0.03	333.42	1.19	22.05
23	6.53	5.79	0.00	0.03	345.64	1.20	19.81
24	7.11	4.92	0.00	0.03	357.86	1.21	16.45
25	7.40	3.79	0.00	0.03	10.07	1.22	12.02
26	-7.32	+2.42	0.00	+0.03	22.27	-1.23	6.70
27	6.83	+0.88	0.00	0.03	34.47	1.24	0.81
28	5.89	-0.76	+0.01	0.03	46.66	1.26	354.82
29	4.51	2.40	0.01	0.03	58.84	1.28	349.18
30	2.75	3.92	0.01	0.03	71.02	1.30	344.30
31	-0.70	-5.17	+0.01	+0.03	83.20	-1.31	340.46
Sept. 1	+1.46	6.06	0.01	0.03	95.37	1.33	337.86
2	3.53	6.52	0.01	0.03	107.55	1.35	336.62
3	5.34	6.51	0.01	0.03	119.72	1.37	336.83
4	6.74	6.08	0.01	0.03	131.90	1.38	338.49
5	+7.65	-5.29	+0.01	+0.03	144.09	-1.40	341.49
6	8.04	4.22	0.01	0.03	156.28	1.42	345.62
7	7.95	2.96	0.01	0.03	168.48	1.43	350.54
8	7.44	1.58	0.01	0.03	180.68	1.44	355.86
9	6.59	-0.17	0.01	0.03	192.89	1.46	1.20
10	+5.50	+1.23	+0.01	+0.03	205.10	-1.47	6.25
11	4.25	2.55	0.01	0.03	217.32	1.48	10.82
12	2.92	3.75	0.01	0.04	229.55	1.49	14.78
13	1.56	4.78	0.01	0.04	241.77	1.50	18.05
14	+0.22	5.61	0.01	0.04	254.00	1.51	20.60
15	-1.06	+6.20	+0.01	+0.04	266.23	-1.51	22.38
16	2.26	6.52	0.01	0.04	278.46	1.52	23.33
17	3.37	6.55	0.01	0.04	290.69	1.52	23.38
18	4.36	6.30	0.01	0.04	302.92	1.52	22.44
19	5.23	5.74	0.01	0.04	315.14	1.52	20.45
20	-5.94	+4.92	+0.01	+0.04	327.36	-1.52	17.37
21	6.47	3.84	0.01	0.04	339.57	1.51	13.25
22	6.76	2.54	0.01	0.03	351.78	1.51	8.24
23	6.76	+1.08	0.01	0.03	3.98	1.51	2.63
24	6.41	-0.48	0.01	0.03	16.17	1.51	356.81
25	-5.68	-2.05	+0.01	+0.03	28.36	-1.51	351.18
26	4.52	3.53	0.01	0.03	40.53	1.51	346.13
27	2.99	4.81	0.01	0.03	52.70	1.51	341.94
28	-1.15	5.79	0.01	0.03	64.87	1.51	338.82
29	+0.86	6.36	0.01	0.03	77.03	1.51	336.97
30	+2.86	-6.49	+0.01	+0.03	89.19	-1.51	336.52
Oct. 1	+4.66	-6.17	+0.01	+0.03	101.35	-1.52	337.56

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.  
FOR GREENWICH MEAN MIDNIGHT.

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C	
	Long.	Lat.	Long.	Lat.	Colong.	Lat.		
	°	°	°	°	°	°	°	
Oct.	1	+4.66	−6.17	+0.01	+0.03	101.35	−1.52	337.56
	2	6.11	5.45	0.02	0.03	113.51	1.52	340.08
	3	7.09	4.41	0.02	0.03	125.67	1.52	343.91
	4	7.57	3.14	0.02	0.03	137.84	1.52	348.72
	5	7.55	1.74	0.02	0.03	150.01	1.52	354.09
	6	+7.09	−0.30	+0.01	+0.04	162.19	−1.52	359.58
	7	6.27	+1.13	0.01	0.04	174.38	1.52	4.83
	8	5.19	2.47	0.01	0.04	186.57	1.52	9.61
	9	3.93	3.69	0.01	0.04	198.76	1.52	13.77
	10	2.60	4.73	0.01	0.04	210.96	1.52	17.25
	11	+1.25	+5.57	+0.01	+0.04	223.17	−1.52	20.01
	12	−0.05	6.18	0.01	0.04	235.38	1.51	22.01
	13	1.25	6.52	0.01	0.04	247.59	1.51	23.20
	14	2.32	6.57	0.01	0.04	259.80	1.50	23.49
	15	3.25	6.33	0.01	0.04	272.02	1.49	22.81
	16	−4.03	+5.79	+0.01	+0.04	284.23	−1.48	21.07
	17	4.67	4.96	0.01	0.04	296.44	1.47	18.21
	18	5.14	3.88	0.01	0.04	308.65	1.46	14.28
	19	5.46	2.59	0.01	0.04	320.86	1.44	9.44
	20	5.58	+1.14	0.01	0.04	333.06	1.43	3.95
	21	−5.49	−0.39	+0.01	+0.04	345.25	−1.41	358.22
	22	5.14	1.93	0.01	0.04	357.44	1.39	352.62
	23	4.50	3.39	0.01	0.03	9.62	1.38	347.52
	24	3.56	4.67	0.01	0.03	21.79	1.36	343.18
	25	2.32	5.68	0.01	0.03	33.95	1.35	339.78
	26	−0.84	−6.33	+0.01	+0.03	46.11	−1.33	337.50
	27	+0.80	6.57	0.01	0.03	58.26	1.32	336.48
	28	2.44	6.37	0.01	0.03	70.40	1.30	336.88
	29	3.96	5.75	0.01	0.03	82.55	1.28	338.77
	30	5.20	4.77	0.01	0.03	94.69	1.27	342.08
Nov.	31	+6.08	−3.51	+0.01	+0.03	106.83	−1.25	346.58
	1	6.52	2.08	0.01	0.04	118.98	1.24	351.88
	2	6.52	−0.58	0.01	0.04	131.13	1.22	357.50
	3	6.11	+0.91	0.01	0.04	143.28	1.21	3.00
	4	5.36	2.32	0.01	0.04	155.44	1.19	8.06
	5	+4.34	+3.59	+0.01	+0.04	167.61	−1.18	12.51
	6	3.13	4.69	0.01	0.04	179.78	1.17	16.25
	7	1.83	5.58	0.01	0.04	191.96	1.16	19.26
	8	+0.52	6.22	0.01	0.04	204.14	1.14	21.51
	9	−0.74	6.61	0.01	0.04	216.33	1.13	22.96
	10	−1.86	+6.71	+0.01	+0.04	228.52	−1.12	23.55
	11	2.83	6.50	0.01	0.04	240.72	1.10	23.18
	12	3.60	6.00	0.01	0.04	252.91	1.08	21.76
	13	4.15	5.20	0.01	0.04	265.11	1.07	19.20
	14	4.50	4.12	0.01	0.04	277.31	1.05	15.51
	15	−4.64	+2.82	+0.01	+0.04	289.51	−1.02	10.80
16	−4.60	+1.34	+0.01	+0.04	301.71	−1.00	5.35	

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE MOON.

FOR GREENWICH MEAN MIDNIGHT.

Date.	The Earth's Selenographic—		Physical Libration.		The Sun's Selenographic—		C
	Long.	Lat.	Long.	Lat.	Colong.	Lat.	
	°	°	°	°	°	°	°
Nov. 16	-4.60	+1.34	+0.01	+0.04	301.71	-1.00	5.35
17	4.37	-0.24	0.01	0.04	313.90	0.97	359.56
18	3.96	1.82	0.01	0.04	326.09	0.95	353.85
19	3.39	3.31	0.01	0.04	338.28	0.92	348.61
20	2.64	4.62	0.01	0.04	350.45	0.89	344.10
21	-1.73	-5.67	+0.01	+0.04	2.62	-0.86	340.51
22	-0.68	6.38	0.01	0.04	14.78	0.83	337.97
23	+0.48	6.69	0.01	0.04	26.93	0.80	336.61
24	1.67	6.59	0.01	0.04	39.08	0.77	336.54
25	2.82	6.08	0.01	0.04	51.22	0.74	337.86
26	+3.85	-5.19	+0.01	+0.04	63.35	-0.71	340.59
27	4.67	4.00	0.01	0.04	75.49	0.68	344.61
28	5.21	2.60	0.01	0.04	87.62	0.65	349.63
29	5.43	-1.07	0.01	0.04	99.75	0.62	355.20
30	5.32	+0.48	0.01	0.04	111.88	0.60	0.85
Dec. 1	+4.87	+1.97	+0.01	+0.04	124.02	-0.57	6.19
2	4.13	3.33	0.01	0.04	136.16	0.55	10.96
3	3.15	4.52	0.01	0.04	148.31	0.53	15.03
4	1.99	5.48	0.01	0.04	160.46	0.50	18.34
5	+0.73	6.21	+0.01	0.04	172.61	0.48	20.87
6	-0.56	+6.66	0.00	+0.04	184.77	-0.47	22.60
7	1.79	6.84	0.00	0.04	196.94	0.45	23.50
8	2.91	6.72	0.00	0.04	209.11	0.43	23.47
9	3.83	6.30	0.00	0.04	221.29	0.41	22.44
10	4.52	5.57	0.00	0.04	233.48	0.39	20.30
11	-4.94	+4.56	0.00	+0.04	245.66	-0.36	17.01
12	5.06	3.29	0.00	0.04	257.85	0.34	12.60
13	4.88	1.81	0.00	0.04	270.04	0.32	7.28
14	4.43	+0.20	0.00	0.04	282.23	0.29	1.42
15	3.74	-1.45	0.00	0.04	294.42	0.26	355.49
16	-2.86	-3.03	0.00	+0.04	306.61	-0.23	349.94
17	1.84	4.43	0.00	0.04	318.80	0.20	345.11
18	-0.74	5.56	0.00	0.04	330.97	0.16	341.22
19	+0.38	6.35	0.00	0.04	343.14	0.13	338.41
20	1.46	6.74	0.00	0.04	355.31	0.10	336.77
21	+2.46	-6.72	0.00	+0.04	7.46	-0.06	336.39
22	3.34	6.30	0.00	0.04	19.61	-0.02	337.34
23	4.06	5.51	0.00	0.04	31.76	+0.01	339.64
24	4.59	4.40	0.00	0.04	43.89	0.05	343.21
25	4.90	3.07	0.00	0.04	56.02	0.09	347.85
26	+5.00	-1.58	0.00	+0.04	68.15	+0.12	353.20
27	4.85	-0.04	0.00	0.04	80.28	0.16	358.82
28	4.47	+1.48	0.00	0.04	92.41	0.19	4.30
29	3.86	2.90	0.00	0.04	104.54	0.22	9.32
30	3.04	4.17	0.00	0.04	116.67	0.25	13.68
31	+2.03	+5.22	0.00	+0.04	128.80	+0.28	17.29
32	+0.88	+6.03	0.00	+0.04	140.94	+0.30	20.12

# 624 ILLUMINATED DISK OF MERCURY, 1917.

FOR GREENWICH MEAN NOON.

Date.	<i>k</i>	<i>i</i>	$\theta$	<i>L</i>	Stellar Mag.	Date.	<i>k</i>	<i>i</i>	$\theta$	<i>L</i>	Stellar Mag.
		°	°					°	°		
Jan. 1	0.650	72	352	59.1	-0.4	July 5	0.934	30	185	67.5	-1.4
6	0.451	96	347	61.5	-0.1	10	0.993	9	212	65.6	1.8
11	0.212	125	342	41.8	+0.8	15	0.990	12	344	57.8	1.6
16	0.035	158	324	8.4	2.1	20	0.947	27	3	48.7	1.1
21	0.026	161	204	6.0	2.3	25	0.888	39	11	41.2	0.7
26	0.158	133	184	27.6	+1.2	30	0.827	49	16	36.1	-0.3
31	0.322	110	178	39.5	0.7	Aug. 4	0.766	58	19	33.0	-0.1
Feb. 5	0.464	94	175	40.3	0.4	9	0.707	66	22	31.4	+0.1
10	0.573	82	171	37.1	0.2	14	0.646	73	24	30.9	0.3
15	0.656	72	168	33.5	0.2	19	0.580	81	26	31.2	0.4
20	0.721	64	164	30.8	+0.1	24	0.504	90	28	32.1	+0.6
25	0.775	57	160	29.2	0.0	29	0.415	100	30	32.7	0.7
Mar. 2	0.821	50	157	28.6	-0.1	Sept. 3	0.309	112	32	31.4	0.9
7	0.862	44	153	29.1	0.2	8	0.188	129	36	25.2	1.3
12	0.901	37	150	31.0	0.4	13	0.071	149	44	12.3	2.0
17	0.939	29	146	34.4	-0.7	18	0.006	171	96	1.3	+2.9
22	0.972	19	142	39.9	1.0	23	0.056	153	192	11.5	2.0
27	0.996	7	125	47.9	1.5	28	0.228	123	203	40.6	+0.8
Apr. 1	0.994	9	351	58.0	1.6	Oct. 3	0.464	94	207	63.2	-0.1
6	0.943	28	337	67.4	1.4	8	0.681	69	209	66.5	0.6
11	0.826	49	336	70.3	-1.1	13	0.835	48	211	57.8	-0.9
16	0.663	71	336	64.4	-0.6	18	0.925	32	212	46.8	1.0
21	0.489	91	337	53.0	0.0	23	0.971	20	213	38.0	1.0
26	0.330	110	338	40.0	+0.6	28	0.993	10	214	31.9	1.0
May 1	0.198	127	339	27.2	1.2	Nov. 2	1.000	2	225	28.0	1.0
6	0.094	144	340	14.6	+1.9	7	0.998	5	21	25.6	-0.8
11	0.026	162	342	4.4	2.6	12	0.991	11	22	24.6	0.7
16	0.000	178	40	0.0	3.5	17	0.978	17	20	24.7	0.6
21	0.020	164	149	3.3	2.8	22	0.959	23	17	25.9	0.5
26	0.075	148	152	11.2	2.1	27	0.932	30	14	28.4	0.4
31	0.154	134	154	19.8	+1.6	Dec. 2	0.893	38	10	32.4	-0.4
June 5	0.243	121	156	27.0	1.2	7	0.834	48	6	38.5	0.4
10	0.340	109	158	33.0	0.8	12	0.745	61	2	46.7	0.4
15	0.446	96	161	38.8	+0.5	17	0.608	78	358	55.5	-0.3
20	0.562	83	165	45.6	0.0	22	0.412	100	354	57.0	+0.1
25	0.691	68	169	53.7	-0.4	27	0.181	130	350	36.7	+0.9
30	0.824	50	176	62.3	-0.9	32	0.019	164	328	4.8	+2.3

## NOTATION.

*k*=the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

*i*=the angle between the Sun and Earth, as seen from the planet.

$\theta$ =the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

*L*=the brilliancy of the disk. The unit of *L* is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

## FOR GREENWICH MEAN NOON.

Date.	<i>k</i>	<i>i</i>	$\theta$	<i>L</i>	Stellar Mag.	Date.	<i>k</i>	<i>i</i>	$\theta$	<i>L</i>	Stellar Mag.
		°	°					°	°		
Jan. 1	0.885	39.6	189.5	61.0	-3.4	July 5	0.945	27.2	8.7	52.2	-3.3
6	0.895	37.8	186.7	59.5	3.4	10	0.936	29.2	10.9	52.9	3.3
11	0.904	36.0	183.7	58.2	3.4	15	0.927	31.2	12.9	53.8	3.3
16	0.913	34.3	180.6	57.0	3.4	20	0.918	33.2	14.8	54.8	3.3
21	0.921	32.5	177.5	55.8	3.4	25	0.908	35.3	16.4	55.8	3.3
26	0.929	30.9	174.3	54.7	-3.4	30	0.898	37.3	17.9	56.9	-3.3
31	0.937	29.2	171.2	53.7	3.3	Aug. 4	0.887	39.3	19.2	58.1	3.3
Feb. 5	0.944	27.5	168.1	52.8	3.3	9	0.876	41.2	20.2	59.4	3.4
10	0.950	25.8	165.2	51.9	3.3	14	0.864	43.2	21.1	60.8	3.4
15	0.956	24.1	162.4	51.2	3.3	19	0.852	45.2	21.7	62.3	3.4
20	0.962	22.4	159.8	50.5	-3.3	24	0.840	47.1	22.1	64.0	-3.4
25	0.967	20.8	157.3	49.8	3.3	29	0.827	49.1	22.3	65.8	3.4
Mar. 2	0.972	19.2	155.0	49.2	3.4	Sept. 3	0.814	51.1	22.3	67.8	3.4
7	0.977	17.5	152.9	48.7	3.4	8	0.801	53.0	22.0	70.0	3.4
12	0.981	15.8	151.0	48.2	3.4	13	0.787	55.0	21.5	72.3	3.5
17	0.985	14.2	149.3	47.8	-3.4	18	0.773	57.0	20.8	74.8	-3.5
22	0.988	12.5	147.6	47.5	3.4	23	0.758	58.9	19.8	77.6	3.5
27	0.991	10.8	146.0	47.2	3.4	28	0.743	60.9	18.7	80.6	3.5
Apr. 1	0.994	9.1	144.2	47.0	3.4	Oct. 3	0.727	62.9	17.3	84.0	3.6
6	0.996	7.4	142.2	46.8	3.4	8	0.712	65.0	15.7	87.6	3.6
11	0.998	5.6	139.2	46.7	-3.4	13	0.695	67.0	13.9	91.5	-3.6
16	0.999	4.0	133.7	46.6	3.5	18	0.678	69.1	11.9	95.9	3.7
21	1.000	2.3	119.8	46.6	3.5	23	0.661	71.2	9.7	100.7	3.7
26	1.000	1.3	69.0	46.6	3.5	28	0.643	73.4	7.5	105.9	3.7
May 1	1.000	2.2	11.6	46.7	3.5	Nov. 2	0.624	75.7	5.1	111.7	3.8
6	0.999	3.8	356.2	46.8	-3.5	7	0.604	78.0	2.7	118.0	-3.8
11	0.998	5.6	351.5	47.0	3.4	12	0.584	80.4	0.3	125.0	3.9
16	0.996	7.5	350.0	47.2	3.4	17	0.562	82.9	357.9	132.5	3.9
21	0.993	9.4	350.2	47.5	3.4	22	0.539	85.5	355.6	140.8	4.0
26	0.990	11.3	351.2	47.8	3.4	27	0.515	88.2	353.3	149.8	4.0
31	0.987	13.3	352.7	48.2	-3.4	Dec. 2	0.490	91.1	351.2	159.4	-4.1
June 5	0.983	15.2	354.6	48.6	3.4	7	0.463	94.2	349.2	169.9	4.2
10	0.978	17.2	356.8	49.0	3.4	12	0.434	97.6	347.4	180.8	4.2
15	0.972	19.2	359.2	49.6	3.4	17	0.404	101.1	345.7	192.0	4.3
20	0.966	21.2	1.6	50.1	3.4	22	0.370	105.1	344.1	202.5	4.3
25	0.960	23.2	4.0	50.7	-3.3	27	0.334	109.4	342.6	212.0	-4.4
30	0.953	25.2	6.4	51.4	-3.3	32	0.295	114.2	341.0	218.4	-4.4

## NOTATION.

*k* = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

*i* = the angle between the Sun and Earth, as seen from the planet.

$\theta$  = the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

*L* = the brilliancy of the disk. The unit of *L* is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.



## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN NOON.

Date.	Light-Time.	Stellar Magnitude.	$P$	$A_{\oplus} + 180^{\circ}$	$D_{\oplus}$	$A_{\odot} - A_{\oplus}$	$D_{\odot}$	$\odot_{\delta}$
	m		"	"	"	"	"	"
Oct. 1	15.98	+1.6	358.10	221.05	+16.95	-29.59	+ 5.05	12.51
3	15.87	1.6	358.84	222.25	17.29	29.92	5.43	13.46
5	15.76	1.6	359.57	223.45	17.63	30.24	5.80	14.41
7	15.64	1.6	0.30	224.64	17.95	30.57	6.18	15.35
9	15.52	1.6	1.02	225.84	18.26	30.89	6.55	16.29
11	15.41	+1.6	1.75	227.04	+18.57	-31.22	+ 6.91	17.23
13	15.29	1.6	2.46	228.23	18.86	31.54	7.28	18.16
15	15.16	1.5	3.18	229.42	19.15	31.86	7.64	19.10
17	15.04	1.5	3.88	230.60	19.42	32.18	8.00	20.03
19	14.92	1.5	4.59	231.79	19.69	32.50	8.36	20.96
21	14.79	+1.5	5.28	232.97	+19.94	-32.82	+ 8.71	21.89
23	14.66	1.5	5.98	234.15	20.18	33.13	9.07	22.81
25	14.53	1.5	6.66	235.32	20.42	33.43	9.42	23.73
27	14.40	1.5	7.34	236.49	20.64	33.74	9.76	24.66
29	14.27	1.4	8.02	237.65	20.85	34.04	10.10	25.57
31	14.13	+1.4	8.68	238.82	+21.05	-34.33	+10.44	26.49
Nov. 2	14.00	1.4	9.34	239.97	21.24	34.63	10.78	27.40
4	13.86	1.4	9.99	241.12	21.43	34.91	11.12	28.32
6	13.72	1.4	10.64	242.27	21.60	35.19	11.45	29.23
8	13.58	1.4	11.27	243.41	21.76	35.46	11.78	30.14
10	13.44	+1.3	11.90	244.54	+21.91	-35.73	+12.10	31.05
12	13.30	1.3	12.52	245.66	22.05	35.98	12.42	31.95
14	13.15	1.3	13.13	246.78	22.18	36.23	12.74	32.86
16	13.00	1.3	13.73	247.88	22.30	36.47	13.05	33.76
18	12.86	1.3	14.32	248.98	22.41	36.70	13.36	34.66
20	12.71	+1.2	14.91	250.07	+22.51	-36.92	+13.67	35.56
22	12.56	1.2	15.48	251.14	22.60	37.12	13.98	36.46
24	12.41	1.2	16.04	252.21	22.68	37.32	14.28	37.36
26	12.26	1.2	16.59	253.26	22.76	37.50	14.57	38.25
28	12.11	1.1	17.13	254.30	22.82	37.66	14.87	39.14
30	11.95	+1.1	17.66	255.33	+22.87	-37.82	+15.16	40.04
Dec. 2	11.80	1.1	18.17	256.34	22.92	37.95	15.44	40.93
4	11.65	1.1	18.68	257.34	22.96	38.08	15.72	41.82
6	11.49	1.0	19.17	258.33	22.98	38.18	16.00	42.71
8	11.33	1.0	19.65	259.30	23.00	38.27	16.28	43.60
10	11.19	+1.0	20.12	260.25	+23.02	-38.34	+16.55	44.48
12	11.02	1.0	20.57	261.18	23.02	38.39	16.81	45.37
14	10.86	0.9	20.91	262.10	23.02	38.42	17.07	46.26
16	10.70	0.9	21.44	262.99	23.01	38.43	17.33	47.14
18	10.55	0.8	21.85	263.86	22.99	38.42	17.59	48.02
20	10.39	+0.8	22.25	264.71	+22.97	-38.38	+17.84	48.90
22	10.23	0.8	22.63	265.54	22.94	38.32	18.08	49.78
24	10.07	0.8	23.00	266.34	22.91	38.23	18.32	50.66
26	9.91	0.7	23.36	267.12	22.87	38.12	18.56	51.54
28	9.75	0.7	23.70	267.88	22.83	37.98	18.79	52.42
30	9.60	+0.6	24.02	268.61	+22.78	-37.81	+19.02	53.30
32	9.44	+0.6	24.33	269.31	+22.73	-37.62	+19.24	54.13

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

FOR GREENWICH MEAN NOON.

							Mean Time of Transit of Zero Meridian.		
Date.	k	Diameter.	i	q	Q	Central Meridian.	Of Date.	Of Intermedi- ate Date.	
		"	"	"	"	"	h m	h m	
Oct.	1	0.927	5.25	31.32	0.38	287.00	288.41	4 54.3	5 34.1
	3	0.926	5.29	31.57	0.39	287.35	269.03	6 14.0	6 53.8
	5	0.925	5.33	31.82	0.40	287.69	249.64	7 33.6	8 13.5
	7	0.924	5.37	32.06	0.41	288.00	230.26	8 53.3	9 33.2
	9	0.923	5.41	32.29	0.42	288.33	210.87	10 13.0	10 52.8
	11	0.922	5.45	32.53	0.43	288.64	191.49	11 32.7	12 12.5
	13	0.920	5.49	32.76	0.44	288.94	172.11	12 52.3	13 32.2
	15	0.919	5.53	32.98	0.45	289.22	152.74	14 12.0	14 51.8
	17	0.918	5.58	33.20	0.46	289.50	133.36	15 31.6	16 11.4
	19	0.917	5.63	33.42	0.47	289.76	113.99	16 51.2	17 31.0
	21	0.916	5.68	33.63	0.48	290.02	94.63	18 10.8	18 50.6
	23	0.915	5.72	33.84	0.49	290.26	75.26	19 30.4	20 10.2
	25	0.914	5.78	34.04	0.50	290.50	55.91	20 50.0	21 29.7
	27	0.913	5.83	34.24	0.50	290.72	36.56	22 9.5	22 49.3
	29	0.912	5.88	34.43	0.51	290.94	17.21	23 29.0	...
	31	0.911	5.94	34.61	0.52	291.14	357.86	0 8.8	0 48.6
Nov.	2	0.911	6.00	34.79	0.54	291.33	338.52	1 28.3	2 8.0
	4	0.910	6.06	34.97	0.55	291.52	319.19	2 47.8	3 27.5
	6	0.909	6.12	35.14	0.56	291.69	299.86	4 7.2	4 46.9
	8	0.908	6.18	35.30	0.57	291.85	280.54	5 26.6	6 6.3
	10	0.907	6.25	35.45	0.58	292.00	261.23	6 46.0	7 25.6
	12	0.907	6.31	35.59	0.59	292.15	241.92	8 5.3	8 45.0
	14	0.906	6.38	35.73	0.60	292.28	222.62	9 24.6	10 4.3
	16	0.905	6.45	35.86	0.61	292.40	203.34	10 43.9	11 23.5
	18	0.905	6.53	35.97	0.62	292.52	184.06	12 3.1	12 42.7
	20	0.904	6.60	36.08	0.63	292.62	164.80	13 22.3	14 1.8
	22	0.904	6.68	36.18	0.64	292.72	145.54	14 41.4	15 21.0
	24	0.903	6.76	36.27	0.65	292.81	126.30	16 0.5	16 40.0
	26	0.903	6.85	36.35	0.67	292.88	107.06	17 19.5	17 59.0
	28	0.902	6.93	36.42	0.68	292.95	87.85	18 38.5	19 17.9
	30	0.902	7.02	36.47	0.69	293.01	68.64	19 57.4	20 36.8
	Dec.	2	0.902	7.11	36.51	0.70	293.06	49.45	21 16.2
4		0.902	7.21	36.54	0.71	293.10	30.27	22 35.0	23 14.4
6		0.902	7.30	36.56	0.72	293.14	11.11	23 53.7	...
8		0.902	7.40	36.56	0.73	293.16	351.96	0 33.0	1 12.4
10		0.902	7.51	36.55	0.74	293.18	332.83	1 51.6	2 30.9
12		0.902	7.62	36.52	0.75	293.19	313.72	3 10.2	3 49.4
14		0.902	7.73	36.48	0.76	293.19	294.63	4 28.6	5 7.8
16		0.902	7.84	36.42	0.76	293.18	275.56	5 47.0	6 26.1
18		0.903	7.96	36.34	0.77	293.17	256.51	7 5.2	7 44.3
20		0.903	8.08	36.24	0.78	293.14	237.48	8 23.4	9 2.4
22		0.904	8.20	36.12	0.79	293.11	218.47	9 41.4	10 20.4
24		0.905	8.33	35.98	0.80	293.07	199.49	10 59.4	11 38.4
26		0.905	8.47	35.82	0.80	293.03	180.53	12 17.3	12 56.2
28		0.906	8.60	35.64	0.81	292.97	161.60	13 35.0	14 13.9
30		0.907	8.74	35.43	0.81	292.91	142.70	14 52.7	15 31.4
32		0.909	8.89	35.20	0.81	292.84	123.82	16 10.1	...

EPIHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

FOR GREENWICH MEAN NOON.

Date.		Light- Time.	Stellar Magni- tude.	P	$\lambda_{\oplus} + 180^{\circ}$	$D_{\oplus}$	$\lambda_{\odot} + 180^{\circ}$	$D_{\odot}$
		m		°	°	°	°	°
Jan.	1	38.42	-2.1	337.30	249.92	+2.88	260.94	+3.03
	8	39.34	2.1	337.37	250.28	2.85	261.58	3.04
	15	40.27	2.0	337.47	250.80	2.83	262.21	3.04
	22	41.20	2.0	337.60	251.46	2.81	262.85	3.04
	29	42.13	1.9	337.77	252.27	2.80	263.48	3.05
Feb.	5	43.03	-1.9	337.96	253.20	+2.79	264.12	+3.05
	12	43.91	1.8	338.19	254.24	2.79	264.76	3.06
	19	44.75	1.8	338.45	255.39	2.79	265.39	3.06
	26	45.55	1.8	338.73	256.64	2.79	266.02	3.06
Mar.	5	46.29	1.7	339.05	257.96	2.79	266.66	3.06
	12	46.98	-1.7	339.40	259.36	+2.80	267.29	+3.07
	19	47.60	1.7	339.78	260.82	2.81	267.93	3.07
	26	48.15	1.6	340.18	262.33	2.82	268.56	3.07
Apr.	2	48.64	1.6	340.61	263.89	2.83	269.20	3.07
	9	49.04	1.6	341.07	265.48	2.85	269.83	3.07
June	5	49.39	-1.6	345.51	278.88	+2.94	274.97	+3.06
	12	49.07	1.6	346.10	280.48	2.95	275.60	3.06
	19	48.68	1.6	346.69	282.04	2.95	276.23	3.05
	26	48.22	1.6	347.28	283.56	2.96	276.86	3.05
July	3	47.69	1.6	347.87	285.03	2.97	277.49	3.04
	10	47.10	-1.7	348.43	286.45	+2.98	278.12	+3.04
	17	46.45	1.7	348.98	287.80	2.98	278.74	3.03
	24	45.74	1.7	349.51	289.08	2.99	279.37	3.03
	31	44.99	1.8	350.01	290.28	2.99	280.00	3.02
Aug.	7	44.19	1.8	350.48	291.39	3.00	280.62	3.02
	14	43.36	-1.8	350.91	292.40	+3.01	281.25	+3.01
	21	42.50	1.9	351.30	293.30	3.01	281.87	3.00
	28	41.63	1.9	351.63	294.07	3.02	282.50	3.00
Sept.	4	40.74	2.0	351.92	294.72	3.02	283.12	2.99
	11	39.86	2.0	352.14	295.23	3.03	283.75	2.98
	18	38.99	-2.1	352.29	295.59	+3.04	284.37	+2.97
	25	38.14	2.1	352.38	295.79	3.05	284.99	2.96
Oct.	2	37.33	2.2	352.40	295.83	3.05	285.62	2.96
	9	36.57	2.2	352.35	295.70	3.06	286.24	2.95
	16	35.88	2.2	352.22	295.41	3.07	286.86	2.94
	23	35.26	-2.3	352.02	294.96	+3.07	287.48	+2.93
	30	34.73	2.3	351.77	294.37	3.07	288.10	2.92
Nov.	6	34.31	2.3	351.46	293.65	3.07	288.72	2.91
	13	33.99	2.4	351.10	292.82	3.07	289.34	2.90
	20	33.80	2.4	350.71	291.92	3.06	289.96	2.89
	27	33.73	-2.4	350.31	290.97	+3.05	290.58	+2.87
Dec.	4	33.79	2.4	349.91	290.02	3.03	291.20	2.86
	11	33.98	2.4	349.52	289.10	3.01	291.82	2.85
	18	34.29	2.3	349.16	288.23	2.99	292.43	2.84
	25	34.71	2.3	348.85	287.47	2.96	293.05	2.82
	32	35.25	-2.3	348.59	286.82	+2.94	293.67	+2.81

## EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

FOR GREENWICH MEAN NOON.

Date.		Equatorial Diameter.	Excess of Equat. Diameter over Polar.	i	q	Q	Central Meridian.		Correction for Phase.
							System I.	System II.	
		"	"	°	"	°	°	°	°
Jan.	1	43.34	2.62	11.00	0.40	68.38	16.63	176.53	-0.53
	8	42.34	2.56	11.28	0.41	68.60	41.01	147.51	0.55
	15	41.36	2.50	11.40	0.41	68.82	65.22	118.32	0.56
	22	40.42	2.45	11.37	0.40	69.07	89.29	88.98	0.56
	29	39.53	2.39	11.20	0.38	69.33	113.22	59.51	0.55
Feb.	5	38.70	2.34	10.91	0.35	69.62	137.04	29.92	-0.52
	12	37.92	2.29	10.50	0.32	69.93	160.76	0.23	0.48
	19	37.21	2.25	10.00	0.28	70.27	184.39	330.46	0.44
	26	36.56	2.21	9.39	0.25	70.65	207.97	300.63	0.38
Mar.	5	35.97	2.18	8.69	0.21	71.07	231.49	270.75	0.33
	12	35.45	2.15	7.93	0.17	71.53	254.97	240.82	-0.27
	19	34.98	2.12	7.10	0.13	72.06	278.43	210.88	0.22
	26	34.58	2.09	6.23	0.10	72.64	301.88	180.92	0.17
Apr.	2	34.24	2.07	5.31	0.07	73.32	325.33	150.96	0.12
	9	33.96	2.05	4.35	0.05	74.19	348.79	121.02	-0.08
June	5	33.71	2.04	3.91	0.04	253.63	335.48	32.79	+0.07
	12	33.93	2.05	4.87	0.06	254.68	359.38	3.28	0.10
	19	34.20	2.07	5.80	0.09	255.57	23.35	333.84	0.15
	26	34.53	2.09	6.69	0.12	256.37	47.41	304.49	0.20
July	3	34.92	2.11	7.53	0.15	257.11	71.57	275.23	0.25
	10	35.36	2.14	8.32	0.19	257.79	95.81	246.06	+0.30
	17	35.85	2.17	9.04	0.23	258.43	120.16	217.00	0.36
	24	36.41	2.20	9.70	0.26	259.02	144.61	188.03	0.41
	31	37.02	2.24	10.27	0.30	259.58	169.17	159.18	0.46
Aug.	7	37.68	2.28	10.75	0.33	260.11	193.84	130.44	0.50
	14	38.40	2.32	11.13	0.36	260.59	218.64	101.82	+0.54
	21	39.18	2.37	11.40	0.39	261.03	243.57	73.33	0.56
	28	40.00	2.42	11.56	0.41	261.43	268.62	44.98	0.58
Sept.	4	40.87	2.47	11.58	0.42	261.79	293.81	16.75	0.58
	11	41.78	2.53	11.47	0.42	262.08	319.14	348.67	0.57
	18	42.71	2.58	11.20	0.41	262.33	344.62	320.73	+0.54
	25	43.66	2.64	10.78	0.38	262.53	10.23	292.93	0.50
Oct.	2	44.60	2.70	10.19	0.35	262.68	35.99	265.27	0.45
	9	45.53	2.75	9.45	0.31	262.79	61.88	237.74	0.39
	16	46.41	2.81	8.54	0.26	262.86	87.89	210.34	0.32
	23	47.22	2.86	7.47	0.20	262.92	114.01	183.05	+0.24
	30	47.94	2.90	6.26	0.14	263.02	140.23	155.85	0.17
Nov.	6	48.54	2.94	4.92	0.09	263.24	166.50	128.72	0.10
	13	48.99	2.96	3.47	0.04	263.85	192.82	101.63	0.05
	20	49.27	2.98	1.96	0.01	265.76	219.15	74.54	+0.02
	27	49.37	2.99	0.43	0.00	284.11	245.44	47.42	0.00
Dec.	4	49.28	2.98	1.19	0.01	71.73	271.65	20.22	-0.01
	11	49.01	2.97	2.71	0.03	76.18	297.76	352.93	0.03
	18	48.57	2.94	4.20	0.06	77.20	323.74	325.49	0.08
	25	47.97	2.90	5.58	0.11	77.58	349.54	297.89	0.14
	32	47.24	2.86	6.83	0.17	77.73	15.16	270.10	-0.20

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,  
SYSTEM I.

GREENWICH MEAN TIME.

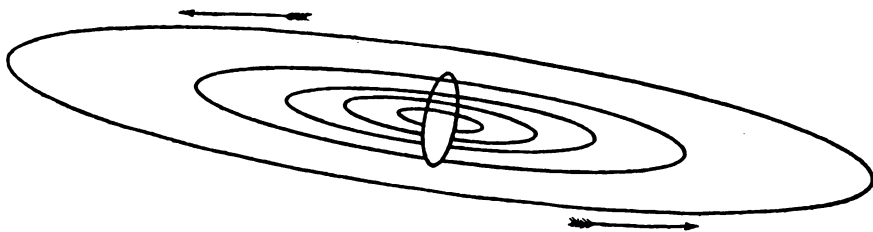
Transit of Zero Meridian.			Interval between Successive Transits.	Transit of Zero Meridian.			Interval between Successive Transits.	Transit of Zero Meridian.			Interval between Successive Transits.
Jan.	d	h m	h m	June	d	h m	h m	Sept.	d	h m	h m
	1	9 24.17	9 50.59		5	0 40.13	9 50.63		19	15 46.25	9 50.47
	3	10 37.10			7	1 53.30			21	16 58.63	
	5	11 50.05			9	3 6.45			23	18 10.99	
	7	13 3.03			11	4 19.60			25	19 23.33	
	9	14 16.03			13	5 32.74			27	20 35.65	
	11	15 29.05	9 50.61		15	6 45.86	9 50.62		29	21 47.95	9 50.45
	13	16 42.09			17	7 58.97		Oct.	1	23 0.24	
	15	17 55.15			19	9 12.07			4	0 12.50	
	17	19 8.22			21	10 25.15			6	1 24.75	
	19	20 21.32			23	11 38.22			8	2 36.99	
	21	21 34.43	9 50.63		25	12 51.28	9 50.61		10	3 49.21	9 50.44
	23	22 47.56			27	14 4.33			12	5 1.41	
	26	0 0.71			29	15 17.36			14	6 13.60	
	28	1 13.87		July	1	16 30.38			16	7 25.76	
	30	2 27.05			3	17 43.39			18	8 37.92	
Feb.	1	3 40.24	9 50.64		5	18 56.38	9 50.59		20	9 50.06	9 50.42
	3	4 53.44			7	20 9.36			22	11 2.19	
	5	6 6.66			9	21 22.33			24	12 14.30	
	7	7 19.89			11	22 35.28			26	13 26.40	
	9	8 33.13			13	23 48.21			28	14 38.50	
	11	9 46.39	9 50.65		16	1 1.13	9 50.58		30	15 50.57	9 50.41
	13	10 59.65			18	2 14.04		Nov.	1	17 2.64	
	15	12 12.92			20	3 26.93			3	18 14.70	
	17	13 26.20			22	4 39.82			5	19 26.75	
	19	14 39.49			24	5 52.68			7	20 38.80	
	21	15 52.79	9 50.66		26	7 5.52	9 50.56		9	21 50.84	9 50.40
	23	17 6.10			28	8 18.36			11	23 2.87	
	25	18 19.41			30	9 31.18			14	0 14.89	
	27	19 32.73		Aug.	1	10 43.98			16	1 26.92	
Mar.	1	20 46.06			3	11 56.77			18	2 38.94	
	3	21 59.39	9 50.67		5	13 9.54	9 50.55		20	3 50.97	9 50.41
	5	23 12.73			7	14 22.29			22	5 3.00	
	8	0 26.07			9	15 35.03			24	6 15.03	
	10	1 39.42			11	16 47.75			26	7 27.07	
	12	2 52.77			13	18 0.46			28	8 39.12	
	14	4 6.13	9 50.67		15	19 13.15	9 50.53		30	9 51.17	9 50.42
	16	5 19.48			17	20 25.82		Dec.	2	11 3.24	
	18	6 32.84			19	21 38.48			4	12 15.32	
	20	7 46.21			21	22 51.12			6	13 27.43	
	22	8 59.57			24	0 3.74			8	14 39.55	
	24	10 12.94	9 50.67		26	1 16.35	9 50.51		10	15 51.69	9 50.44
	26	11 26.31			28	2 28.94			12	17 3.86	
	28	12 39.67			30	3 41.51			14	18 16.05	
	30	13 53.04		Sept.	1	4 54.06			16	19 28.26	
Apr.	1	15 6.41			3	6 6.60			18	20 40.50	
	3	16 19.78	9 50.67		5	7 19.12	9 50.50		20	21 52.77	9 50.46
	5	17 33.14			7	8 31.62			22	23 5.06	
	7	18 46.50			9	9 44.10			25	0 17.38	
	9	19 59.87			11	10 56.57			27	1 29.73	
	11	21 13.23			13	12 9.02			29	2 42.10	
	.....				15	13 21.45	9 50.48		31	3 54.50	9 50.49
	.....				17	14 33.86			33	5 6.93	

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER,  
SYSTEM II.

GREENWICH MEAN TIME.

Transit of Zero Meridian.	Interval between Successive Transits.	Transit of Zero Meridian.	Interval between Successive Transits.	Transit of Zero Meridian.	Interval between Successive Transits.
Jan.    d   h   m	h   m	June    d   h   m	h   m	Sept.    d   h   m	h   m
1   5   4.49	9 55.77	5   9   1.44	9 55.81	20 22 33.66	9 55.65
3   6 43.31		7 10 40.50		23   0 11.91	
5   8 22.15		9 12 19.56		25   1 50.14	
7 10   1.02		11 13 58.60		27   3 28.36	
9 11 39.91		13 15 37.63		29   5   6.55	
11 13 18.82	9 55.79	15 17 16.65	9 55.80	Oct.    1   6 44.73	9 55.63
13 14 57.75		17 18 55.65		3   8 22.89	
15 16 36.70		19 20 34.64		5 10   1.04	
17 18 15.67		21 22 13.62		7 11 39.15	
19 19 54.66		23 23 52.59		9 13 17.25	
21 21 33.67	9 55.81	26   1 31.54	9 55.78	11 14 55.34	9 55.61
23 23 12.69		28   3 10.48		13 16 33.41	
26   0 51.73		30   4 49.41		15 18 11.47	
28   2 30.79		July    2   6 28.32		17 19 49.51	
30   4   9.86		4   8   7.22		19 21 27.54	
Feb.    1   5 48.95	9 55.82	6   9 46.10	9 55.77	21 23   5.55	9 55.60
3   7 28.05		8 11 24.97		24   0 43.55	
5   9   7.16		10 13   3.82		26   2 21.53	
7 10 46.29		12 14 42.66		28   3 59.50	
9 12 25.43		14 16 21.49		30   5 37.46	
11 14   4.58	9 55.83	16 18   0.31	9 55.76	Nov.    1   7 15.41	9 55.59
13 15 43.74		18 19 39.10		3   8 53.35	
15 17 22.91		20 21 17.89		5 10 31.29	
17 19   2.09		22 22 56.65		7 12   9.21	
19 20 41.28		25   0 35.41		9 13 47.12	
21 22 20.48	9 55.84	27   2 14.14	9 55.74	11 15 25.04	9 55.58
23 23 59.69		29   3 52.86		13 17   2.94	
26   1 38.90		31   5 31.57		15 18 40.84	
28   3 18.12		Aug.    2   7 10.26		17 20 18.75	
Mar.    2   4 57.34		4   8 48.93		19 21 56.65	
4   6 36.58	9 55.85	6 10 27.59	9 55.73	21 23 34.55	9 55.58
6   8 15.81		8 12   6.23		24   1 12.47	
8   9 55.06		10 13 44.85		26   2 50.38	
10 11 34.31		12 15 23.46		28   4 28.31	
12 13 13.56		14 17   2.05		30   6   6.24	
14 14 52.81	9 55.85	16 18 40.62	9 55.71	Dec.    2   7 44.19	9 55.60
16 16 32.07		18 20 19.18		4   9 22.15	
18 18 11.33		20 21 57.72		6 11   0.13	
20 19 50.59		22 23 36.24		8 12 38.13	
22 21 29.85		25   1 14.74		10 14 16.15	
24 23   9.12	9 55.85	27   2 53.23	9 55.69	12 15 54.19	9 55.62
27   0 48.39		29   4 31.70		14 17 32.26	
29   2 27.66		31   6 10.15		16 19 10.35	
31   4   6.93		Sept.   2   7 48.58		18 20 48.47	
Apr.    2   5 46.19		4   9 27.00		20 22 26.62	
4   7 25.46	9 55.85	6 11   5.39	9 55.67	23   0   4.79	9 55.65
6   9   4.72		8 12 43.77		25   1 42.99	
8 10 43.98		10 14 22.14		27   3 21.22	
10 12 23.25		12 16   0.48		29   4 59.48	
12 14   2.49		14 17 38.80		31   6 37.77	
.....		16 19 17.11	9 55.65	33   8 16.08	9 55.67
.....		18 20 55.40		35   9 54.41	

## South



## North

**APPARENT ORBITS OF THE SATELLITES OF JUPITER AT DATE OF OPPOSITION, NOVEMBER 28, 1917, AS SEEN IN AN INVERTING TELESCOPE, AND ELONGATED IN THE RATIO OF THREE TO ONE IN THE DIRECTION OF THEIR MINOR AXES.**

In the above diagram the central ellipse represents the disk of Jupiter, and the inner orbit is that of Satellite V.

In the diagrams of the configurations of Jupiter's four brighter satellites, pages 637-657, Jupiter is represented by a light disk, ○, in the center of the page, and the relative positions of the satellites at the Greenwich time stated above the diagrams are indicated by dots. The designation of each satellite is shown by a numeral placed to the right or left of the dot, according as the motion of the satellite at the instant in question is toward the east or toward the west, the motion being always toward the numeral. In constructing the diagrams the latitudes of the satellites are always considered zero, except where two or more of them chance to be at nearly the same distance from the planet, when they are placed one above the other, according to their apparent latitudes. If, at the epoch of any configuration, one or more satellites are projected on the disk of the planet, that phenomenon is indicated by a light disk, ○, at the left-hand side of the page; and if any satellites are invisible on account of being occulted behind the disk of the planet, or eclipsed by its shadow, that circumstance is indicated by a dark disk, ●, at the right-hand side of the page. In both cases the annexed numerals serve to point out which satellites are thus rendered invisible.

### MEAN SYNODIC PERIODS OF THE SATELLITES.

	d	h	m	s	d		d	h	m	s	d
I.	1	18	28	35.946	=	1.769	860	49			
II.	3	13	17	53.736	=	3.554	094	17			
III.	7	3	59	35.856	=	7.166	387	22			
IV.	16	18	5	6.916	=	16.753	552	27			

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V.	0	11	57	27.635	=	0.498	236	52			
VI.					=	266.00					
VII.					=	276.67					



## SATELLITE V.

GREENWICH MEAN TIME OF EVERY TWENTIETH GREATEST ELONGATION.

Jan.	d	h	E.	Oct.	d	h	E.	Jan.	d	h	W.	Oct.	d	h	W.
	1	10.2	E.		12	22.7	E.		1	16.2	W.		13	4.7	W.
	11	9.3	E.		22	21.8	E.		11	15.3	W.		23	3.8	W.
	21	8.5	E.	Nov.	1	20.9	E.		21	14.5	W.	Nov.	2	2.9	W.
	31	7.7	E.		11	20.0	E.		31	13.7	W.		12	2.0	W.
Sept.	3	2.3	E.		21	19.1	E.		..	..	..		22	1.0	W.
	13	1.4	E.	Dec.	1	18.1	E.	Sept.	3	8.2	W.	Dec.	2	0.1	W.
	23	0.5	E.		11	17.2	E.		13	7.4	W.		11	23.2	W.
Oct.	2	23.6	E.		21	16.3	E.		23	6.5	W.		21	22.3	W.
					31	15.4	E.	Oct.	3	5.6	W.		31	21.4	W.

GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

## SATELLITE I.

Jan.	d	h	m	s	Mar.	d	h	m	s	July	d	h	m	s	Oct.	d	h	m	s
	1	21	29	47		26	2	41	45		20	23	58	36		12	4	14	48
	3	15	58	14		27	21	12	7		22	18	28	15		13	22	41	38
	5	10	26	39		29	15	42	32		24	12	57	48		15	17	8	31
	7	4	55	13		31	10	12	56		26	7	27	21		17	11	35	15
	8	23	23	48	Apr.	2	4	43	20		28	1	56	49		19	6	1	59
	10	17	52	32		3	23	13	45		29	20	26	19		21	0	28	33
	12	12	21	14		5	17	44	12		31	14	55	42		22	18	55	11
	14	6	50	5		7	12	14	39	Aug.	2	9	25	6		24	13	21	39
	16	1	18	56		9	6	45	5		4	3	54	24		26	7	48	9
	17	19	47	57		11	1	15	31		5	22	23	44		28	2	14	29
	19	14	16	54		12	19	46	0		7	16	52	57		29	20	40	53
	21	8	46	1		14	14	16	28		9	11	22	10		31	15	7	8
	23	3	15	7		16	8	46	55		11	5	51	17	Nov.	2	9	33	26
	24	21	44	22		18	3	17	22		13	0	20	27		4	3	59	34
	26	16	13	34		19	21	47	52		14	18	49	28		5	22	25	46
	28	10	42	54		21	16	18	21		16	13	18	30		7	16	51	50
	30	5	12	14		..	..	..	..		18	7	47	25		9	11	17	58
	31	23	41	43		..	..	..	..		20	2	16	22		11	5	43	56
Feb.	2	18	11	8		..	..	..	..		21	20	45	12		13	0	10	0
	4	12	40	40	June	1	9	58	2		23	15	14	1		14	18	35	57
	6	7	10	13		3	4	28	23		25	9	42	42		16	13	1	57
	8	1	39	52		4	22	58	39		27	4	11	27		18	7	27	50
	9	20	9	29		6	17	28	56		28	22	40	3		20	1	53	49
	11	14	39	12		8	11	59	11		30	17	8	39		21	20	19	41
	13	9	8	55		10	6	29	29	Sept.	1	11	37	6		23	14	45	39
	15	3	38	45		12	0	59	39		3	6	5	37		25	9	11	29
	16	22	8	32		13	19	29	51		5	0	33	58		27	3	37	27
	18	16	38	25		15	14	0	2		6	19	2	20		28	22	3	19
	20	11	8	17		17	8	30	14		8	13	30	33		30	16	29	17
	22	5	38	17		19	3	0	21		10	7	58	49	Dec.	2	10	55	9
	24	0	8	13		20	21	30	29		12	2	26	55		4	5	21	10
	25	18	38	14		22	16	0	35		13	20	55	1		5	23	47	5
	27	13	8	15		24	10	30	41		15	15	22	58		7	18	13	9
Mar.	1	7	38	21		26	5	0	43		17	9	50	58		9	12	39	6
	3	2	8	25		27	23	30	45		19	4	18	48		11	7	5	13
	4	20	38	33		29	18	0	45		20	22	46	38		13	1	31	17
	6	15	8	41	July	1	12	30	45		22	17	14	18		14	19	57	29
	8	9	38	54		3	7	0	41		24	11	42	2		16	14	23	36
	10	4	9	4		5	1	30	37		26	6	9	35		18	8	49	54
	11	22	39	17		6	20	0	30		28	0	37	9		20	3	16	8
	13	17	9	31		8	14	30	25		29	19	4	32		21	21	42	32
	15	11	39	49		10	9	0	14	Oct.	1	13	31	59		23	16	8	51
	17	6	10	4		12	3	30	3		3	7	59	15		25	10	35	22
	19	0	40	23		13	21	59	49		5	2	26	32		27	5	1	51
	20	19	10	41		15	16	29	36		6	20	53	38		28	23	28	32
	22	13	41	3		17	10	59	17		8	15	20	49		30	17	55	
	24	8	11	23		19	5	28	59		10	9	47	48		31	12	22	

## GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

## SATELLITE II.

	d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s
Jan.	1	7	14	45	Mar.	27	15	57	52	July	19	13	40	36	Oct.	12	20	38	27
	4	20	31	0		31	5	24	6		23	3	3	37		16	9	48	50
	8	9	47	49		3	18	49	44		26	16	25	48		19	22	58	44
	11	23	5	18		7	8	16	16		30	5	48	3		23	12	8	1
	15	12	23	19		10	21	42	10		Aug. 2	19	9	30		27	1	16	52
Feb.	19	1	42	0	June	14	11	8	57	Sept.	6	8	30	58	Nov.	30	14	25	12
	22	15	1	5		18	0	34	59		9	21	51	39		3	3	33	7
	26	4	20	54		21	14	1	57		13	11	12	12		6	16	40	36
	29	17	41	1		..	..	..	..		17	0	32	1		10	5	47	46
	2	7	1	53		..	..	..	..		20	13	51	38		13	18	54	38
Mar.	5	20	22	57	June	..	..	..	..	Sept.	24	3	10	33	Dec.	17	8	1	16
	9	9	44	45		3	7	19	48		27	16	29	8		20	21	7	41
	12	23	6	40		6	20	45	19		31	5	47	2		24	10	14	2
	16	12	29	20		10	10	11	32		3	19	4	33		27	23	20	19
	20	1	52	3		13	23	36	45		7	8	21	25		1	12	26	40
Mar.	23	15	15	31	July	17	13	2	38	Oct.	10	21	37	50	Dec.	5	1	33	4
	27	4	38	54		21	2	27	30		14	10	53	34		8	14	39	37
	2	18	3	3		24	15	52	54		18	0	8	48		12	3	46	22
	6	7	27	4		28	5	17	21		21	13	23	22		15	16	53	26
	9	20	51	53		1	18	42	15		25	2	37	25		19	6	0	50
Mar.	13	10	16	23	July	5	8	6	15	Oct.	28	15	50	49	Dec.	22	19	8	36
	16	23	41	45		8	21	30	34		2	5	3	36		26	8	16	50
	20	13	6	41		12	10	54	1		5	18	15	49		29	21	25	31
	24	2	32	33		16	0	17	43		9	7	27	24		33	10	34	46

## SATELLITE III.

	d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s
Jan.	5	12	3	55	Apr.	1	15	14	21	July	18	10	20	8	Oct.	12	10	17	0
	12	16	0	55		8	19	43	22		25	14	38	49		19	13	47	47
	19	20	3	2		16	0	13	17		Aug. 1	18	55	9		26	17	14	7
	27	0	9	0		..	..	..	..		8	23	9	21		Nov. 2	20	36	53
	3	4	19	11		..	..	..	..		16	3	19	48		9	23	56	28
Feb.	10	8	32	7	June	..	..	..	..	Sept.	23	7	26	51	Dec.	17	3	14	9
	17	12	48	7		5	7	48	13		30	11	29	36		24	6	29	38
	24	17	7	0		12	12	17	1		6	15	28	20		1	9	44	42
	3	21	28	35		19	16	45	24		13	19	23	11		8	12	59	46
	11	1	52	55		26	21	11	52		20	23	13	38		15	16	16	27
Mar.	18	6	18	39	July	4	1	36	53	Oct.	28	3	0	1	Dec.	22	19	36	7
	25	10	46	13		11	5	59	32		5	6	40	55		29	22	59	29

## SATELLITE IV.

	d	h	m	s		d	h	m	s		d	h	m	s		d	h	m	s
Jan.	6	7	33	33	Apr.	17	6	9	23	June	23	17	50	16	Oct.	2	11	11	25
	23	1	41	8		..	..	..	..		10	14	16	8		19	3	1	58
Feb.	8	20	41	26	..	..	..	..	..	July	27	10	16	35	Nov.	4	17	55	53
	25	16	24	24		..	..	..	..		Aug. 13	5	42	52		21	8	9	8
Mar.	14	12	38	46	..	..	..	..	..	Sept.	30	0	26	38	Dec.	7	22	10	10
	31	9	16	28		June 6	21	6	15		15	18	18	54		24	12	30	7

## DIFFERENTIAL COORDINATES OF SATELLITE VI.

FOR GREENWICH MEAN NOON.

Date.	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$	Date.	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$	Date.	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$
	m   s	'		m   s	'		m   s	'
Jan. 0	+4 21	- 5.0	June 18	-2 16	-15.3	Sept. 26	+3 39	-13.2
4	4 20	3.5	22	2 7	16.8	30	3 53	11.1
8	4 18	2.0	26	1 58	18.1	Oct. 4	4 5	8.9
12	4 14	- 0.5	30	1 48	19.4	8	4 16	6.5
16	4 9	+ 0.9	July 4	1 37	20.6	12	4 26	3.9
20	+4 3	+ 2.3	8	-1 26	-21.6	16	+4 33	- 1.3
24	3 55	3.7	12	1 14	22.5	20	4 38	+ 1.4
28	3 46	5.0	16	1 1	23.4	24	4 41	4.2
Feb. 1	3 36	6.3	20	0 47	24.1	28	4 40	7.0
5	3 25	7.5	24	0 33	24.7	Nov. 1	4 37	9.8
9	+3 13	+ 8.7	28	-0 19	-25.1	5	+4 30	+12.6
13	3 0	9.8	Aug. 1	-0 4	25.4	9	4 20	15.3
17	2 46	10.8	5	+0 11	25.6	13	4 6	17.8
21	2 32	11.8	9	0 27	25.6	17	3 49	20.2
25	2 17	12.7	13	0 43	25.5	21	3 28	22.3
Mar. 1	+2 1	+13.5	17	+0 59	-25.2	25	+3 3	+24.0
5	1 44	14.2	21	1 15	24.7	29	2 36	25.4
9	1 27	14.8	25	1 32	24.1	Dec. 3	2 5	26.3
13	1 9	15.2	29	1 48	23.3	7	1 33	26.7
17	0 51	15.6	Sept. 2	2 5	22.4	11	0 59	26.6
21	+0 32	+15.7	6	+2 21	-21.3	15	+0 25	+26.0
25	+0 14	15.7	10	2 38	20.0	19	-0 10	24.9
29	-0 5	15.5	14	2 54	18.6	23	0 43	23.3
Apr. 2	-0 23	+15.1	18	3 10	17.0	27	1 15	21.3
	. . .	. . .	22	+3 25	-15.2	31	-1 44	+19.0

## DIFFERENTIAL COORDINATES OF SATELLITE VII.

Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$	Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$	Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$
	m   s	'		m   s	'		m   s	'
Jan. 0	-4 39	+ 7.8	June 18	+1 46	- 2.9	Sept. 26	-4 28	+24.2
4	4 32	8.4	22	1 34	1.7	30	4 39	24.0
8	4 23	8.9	26	1 22	- 0.5	Oct. 4	4 48	23.8
12	4 14	9.3	30	1 8	+ 0.8	8	4 56	23.3
16	4 3	9.6	July 4	0 54	2.2	12	5 3	22.7
20	-3 52	+ 9.8	8	+0 40	+ 3.6	16	-5 7	+21.9
24	3 40	10.0	12	0 25	5.1	20	5 9	20.9
28	3 28	10.1	16	+0 10	6.6	24	5 10	19.8
Feb. 1	3 15	10.0	20	-0 6	8.0	28	5 8	18.5
5	3 1	10.0	24	0 22	9.5	Nov. 1	5 3	17.1
9	-2 47	+ 9.8	28	-0 38	+10.9	5	-4 56	+15.6
13	2 33	9.5	Aug. 1	0 54	12.3	9	4 47	14.0
17	2 19	9.2	5	1 11	13.7	13	4 34	12.2
21	2 4	8.7	9	1 27	15.1	17	4 19	10.4
25	1 49	8.3	13	1 44	16.4	21	4 2	8.5
Mar. 1	-1 34	+ 7.7	17	-2 0	+17.6	25	-3 41	+ 6.5
5	1 20	7.1	21	2 17	18.7	29	3 19	4.6
9	1 4	6.4	25	2 33	19.8	Dec. 3	2 54	2.6
13	0 49	5.7	29	2 49	20.8	7	2 28	+ 0.7
17	0 34	4.9	Sept. 2	3 5	21.7	11	2 0	- 1.1
21	-0 19	+ 4.1	6	-3 20	+22.4	15	-1 31	- 2.9
25	-0 4	3.2	10	3 35	23.1	19	1 1	4.6
29	+0 11	2.3	14	3 50	23.6	23	0 31	6.2
Apr. 2	+0 26	+ 1.3	18	4 4	23.9	27	-0 1	7.7
	. . .	. . .	22	-4 16	+24.1	31	+0 28	- 9.0

## GREENWICH MEAN TIME.

## JANUARY.

d h m s		d h m s		d h m s		d h m s	
1 02240	I. Sh. I.	8 134353	II.*Ec. R.	16 104121	III.*Sh. I.	24 247 9	I. Sh. E.
115 1	I. Tr. E.	2218 9	I. Oc. D.	1220 7	III.*Sh. E.	853 48	II. Tr. I.
23114	I. Sh. E.			212255	I. Tr. I.	112926	II.*Tr. E.
55651	II. Oc. D.	9 1458	III. Tr. I.	224253	I. Sh. I.	113611	II.*Sh. I.
83241	II. Oc. R.	14913	I. Ec. R.	233229	I. Tr. E.	14 659	II.*Sh. E.
83357	II. Ec. D.	3 313	III. Tr. E.			203840	I. Oc. D.
11 646	II.*Ec. R.	63858	III. Sh. I.	17 05125	I. Sh. E.		
202411	I. Oc. D.	81815	III. Sh. E.	61448	II. Tr. I.	25 0 937	I. Ec. R.
211056	III. Tr. I.	192755	I. Tr. I.	85019	II. Tr. E.	1748 7	I. Tr. I.
23 633	III. Tr. E.	204713	I. Sh. I.	85825	II. Sh. I.	19 729	I. Sh. I.
235327	I. Ec. R.	213720	I. Tr. E.	112928	II.*Sh. E.	195753	I. Tr. E.
		225544	I. Sh. E.	184216	I. Oc. D.	2116 3	I. Sh. E.
				221356	I. Ec. R.		
2 23559	III. Sh. I.	10 33747	II. Tr. I.	18 155148	I.*Tr. I.	26 3 219	II. Oc. D.
41550	III. Sh. E.	61310	II. Tr. E.	171146	I. Sh. I.	53928	II. Oc. R.
1734 3	I.*Tr. I.	62030	II. Sh. I.	18 124	I. Tr. E.	545 0	II. Ec. D.
185135	I. Sh. I.	85150	II. Sh. E.	192018	I. Sh. E.	81737	II. Ec. R.
194320	I. Tr. E.	164653	I.*Oc. D.			15 752	I.*Oc. D.
21 0 8	I. Sh. E.	201812	I. Ec. R.	19 02334	II. Oc. D.	183830	I. Ec. R.
				3 026	II. Oc. R.	23 618	III. Oc. D.
3 1 253	II. Tr. I.	11 135632	I.*Tr. I.	3 723	II. Ec. D.		
338 5	II. Tr. E.	1516 5	I.*Sh. I.	540 3	II. Ec. R.	27 1 1143	III. Oc. R.
34224	II. Sh. I.	16 559	I.*Tr. E.	131113	I.*Oc. D.	441 3	III. Ec. D.
614 3	II. Sh. E.	172436	I. Sh. E.	164249	I.*Ec. R.	62212	III. Ec. R.
145237	I.*Oc. D.	2147 3	II. Oc. D.	19 1 2	III. Oc. D.	121723	I.*Tr. I.
182227	I. Ec. R.			21 5 3	III. Oc. R.	133628	I.*Sh. I.
						142712	I.*Tr. E.
4 12 223	I.*Tr. I.	12 02333	II. Oc. R.	20 03840	III. Ec. D.	1545 3	I.*Sh. E.
132027	I.*Sh. I.	02953	II. Ec. D.	22013	III. Ec. R.	221410	II. Tr. I.
141142	I.*Tr. E.	3 237	II. Ec. R.	102049	I. Tr. I.		
152859	I.*Sh. E.	111535	I.*Oc. D.	114045	I.*Sh. I.	28 0 4949	II. Tr. E.
191258	II. Oc. D.	1447 5	I.*Ec. R.	123029	I.*Tr. E.	055 7	II. Sh. I.
2149 3	II. Oc. R.	145949	III.*Oc. D.	134917	I.*Sh. E.	32548	II. Sh. E.
215235	II. Ec. D.	17 2 1	III.*Oc. R.	193417	II. Tr. I.	93712	I. Oc. D.
		203544	III. Ec. D.	22 951	II. Tr. E.	13 726	I.*Ec. R.
5 02523	II. Ec. R.	221746	III. Ec. R.	221729	II. Sh. I.		
921 2	I. Oc. D.					29 6 4639	I. Tr. I.
11 359	III.*Oc. D.	13 82517	I. Tr. I.	21 04823	II. Sh. E.	8 521	I. Sh. I.
125120	I.*Ec. R.	945 3	I. Sh. I.	74019	I. Oc. D.	85630	I. Tr. E.
13 351	III.*Oc. R.	103447	I. Tr. E.	111146	I.*Ec. R.	101359	I. Sh. E.
163324	III.*Ec. D.	115334	I.*Sh. E.			162223	II.*Oc. D.
181556	III. Ec. R.	165618	II.*Tr. I.	22 44951	I. Tr. I.	185938	II. Oc. R.
		193144	II. Tr. E.	6 938	I. Sh. I.	19 341	II. Ec. D.
6 63051	I. Tr. I.	193940	II. Sh. I.	65932	I. Tr. E.	213616	II. Ec. R.
74924	I. Sh. I.	221050	II. Sh. E.	81812	I. Sh. E.		
84012	I. Tr. E.			134235	II.*Oc. D.	30 4 632	I. Oc. D.
95756	I. Sh. E.	14 54425	I. Oc. D.	161935	II.*Oc. R.	73619	I. Ec. R.
142022	II.*Tr. I.	916 3	I. Ec. R.	1626 2	II.*Ec. D.	1313 6	III.*Tr. I.
165538	II.*Tr. E.			185839	II. Ec. R.	151622	III.*Tr. E.
17 142	II.*Sh. I.	15 254 3	I. Tr. I.			184535	III. Sh. E.
193310	II. Sh. E.	41356	I. Sh. I.	23 2 925	I. Oc. D.	202332	III. Sh. E.
		5 335	I. Tr. E.	54039	I. Ec. R.		
7 34935	I. Oc. D.	62228	I. Sh. E.	9 610	III. Tr. I.	31 116 2	I. Tr. I.
72018	I. Ec. R.	11 459	II.*Oc. D.	11 813	III.*Tr. E.	23420	I. Sh. I.
		134139	II.*Oc. R.	144332	III.*Sh. I.	32555	I. Tr. E.
8 05919	I. Tr. I.	134831	II.*Ec. D.	162153	III.*Sh. E.	44257	I. Sh. E.
21816	I. Sh. I.	162112	II.*Ec. R.	231859	I. Tr. I.	113435	II.*Tr. I.
3 843	I. Tr. E.					141016	II.*Tr. E.
42648	I. Sh. E.	16 01315	I. Oc. D.	34 03836	I. Sh. I.	141344	II.*Sh. I.
82941	II. Oc. D.	34457	I. Ec. R.	12842	I. Tr. E.	164421	II. Sh. E.
11 558	II.*Oc. R.	5 320	III. Tr. I.			2236 0	I. Oc. D.
1111 9	II.*Ec. D.	7 342	III. Tr. E.				

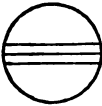
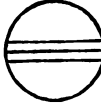
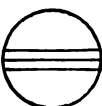

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

\*Visible at Washington.

GREENWICH MEAN TIME.

JANUARY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.		* r	III.		* d   * r
II.		* d   * r	IV. No Eclipse.		

*Configurations at 14<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	4.                      .1   O <sup>3</sup> / <sub>2</sub>	
2	.4                      3.   O   1. 2.	
3	.4   3.   2.   .O 1	
4	O 1.                      .4   .3   .2   O	
5		.4   O <sup>3</sup> / <sub>2</sub> .1   .2
6		1. <sup>3</sup> / <sub>2</sub> O   .4   .3
7		.2   O   .1   .4 3.
8		.1   O   .2 3.                      .4
9		3.   O   1. 2.                      .4
10		3.   2.   .1 O                      4.
11	O 1.                      .3   .2   O	4.
12		.O 3   .2   4.                      .1 ●
13		1.   O 2. <sup>4</sup> / <sub>3</sub>
14		2.   4 O .   .1   3.
15		4. 1.   O   3.                      .2 ●
16	4.                      3.   O   1. 2.	
17	4.                      3. <sup>3</sup> / <sub>1</sub> O	
18	4.                      .3   .2   O 1.	
19	.4                      .3 O   .2                      .1 ●	
20	.4                      1. O   2.   .3	
21	.4 2.                      O   .1   .3	
22		<sup>1</sup> / <sub>4</sub> O   3.                      .2 ●
23		3. O <sup>1</sup> / <sub>4</sub> 2.
24	3.   .1 2.   O                      .4	
25	.3   .2   O   1.                      .4	
26		.3 .O 1   .2                      .4
27	O 1.                      O   2. 3                      4.	
28		2.   O   .1   .3   4.
29		1.   .2 O                      3.   4.
30	O 3.	O   .1 <sup>4</sup> / <sub>2</sub>
31	O 2.	3.   .1 <sup>4</sup> / <sub>2</sub> O

## GREENWICH MEAN TIME.

## FEBRUARY.




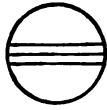
d h m s		d h m s		d h m s		d h m s	
1 2 516	I. Ec. R.	9 19 347	I. Oc. D.	17 21 3235	I. Sh. E.	26 15 4817	I. Sh. I.
19 45 24	I. Tr. I.	22 29 43	I. Ec. R.			16 52 42	I. Tr. E.
21 3 13	I. Sh. I.			18 6 23 14	II. Tr. I.	17 57 23	I. Sh. E.
21 55 20	I. Tr. E.	10 7 28 37	III. Oc. D.	8 46 50	II. Sh. I.		
23 11 52	I. Sh. E.	9 35 38	III. Oc. R.	8 58 51	II. Tr. E.	27 3 20 6	II. Oc. D.
		12 45 24	III.*Ec. D.	11 17 5	II. Sh. E.	8 7 52	II. Ec. R.
2 5 43 12	II. Oc. D.	14 25 58	III.*Ec. R.	15 32 45	I. Oc. D.	12 2 37	I.*Oc. D.
8 20 35	II. Oc. R.	16 13 15	I. Tr. I.	18 54 5	I. Ec. R.	15 18 19	I. Ec. R.
8 22 46	II. Ec. D.	17 27 56	I. Sh. I.				
10 55 20	II. Ec. R.	18 23 24	I. Tr. E.	19 12 42 12	I.*Tr. I.	28 6 18 15	III. Tr. I.
17 5 25	I. Oc. D.	19 36 43	I. Sh. E.	13 52 34	I.*Sh. I.	8 23 9	III. Tr. E.
20 34 8	I. Ec. R.			14 52 35	I.*Tr. E.	9 12 17	I. Tr. I.
		11 3 38 51	II. Tr. I.	16 1 31	I. Sh. E.	10 17 14	I. Sh. I.
3 3 15 59	III. Oc. D.	6 9 48	II. Sh. I.			10 55 18	III. Sh. I.
5 22 23	III. Oc. R.	6 14 31	II. Tr. E.	20 0 33 15	II. Oc. D.	11 22 51	I. Tr. E.
8 43 36	III. Ec. D.	8 40 10	II. Sh. E.	5 29 50	II. Ec. R.	12 26 23	I.*Sh. E.
10 24 27	III. Ec. R.	13 33 31	I.*Oc. D.	10 2 38	I. Oc. D.	12 32 20	III.*Sh. E.
14 14 54	I.*Tr. I.	16 58 36	I. Ec. R.	13 22 55	I.*Ec. R.	22 31 53	II. Tr. I.
15 32 12	I.*Sh. I.						
16 24 52	I. Tr. E.	12 10 42 55	I. Tr. I.	21 1 56 54	III. Tr. I.		
17 40 52	I. Sh. E.	11 56 50	I.*Sh. I.	4 1 48	III. Tr. E.		
		12 53 7	I.*Tr. E.	6 52 35	III. Sh. I.		
4 0 55 45	II. Tr. I.	14 5 39	I.*Sh. E.	7 12 11	I. Tr. I.		
3 31 26	II. Tr. E.	21 47 53	II. Oc. D.	8 21 32	I. Sh. I.		
3 32 33	II. Sh. I.			8 29 43	III. Sh. E.		
6 3 3	II. Sh. E.	13 2 51 51	II. Ec. R.	9 22 35	I. Tr. E.		
11 34 58	I.*Oc. D.	8 3 14	I. Oc. D.	10 30 31	I. Sh. E.		
15 3 3	I.*Ec. R.	11 27 27	I.*Ec. R.	19 45 46	II. Tr. I.		
		21 38 57	III. Tr. I.	22 5 13	II. Sh. I.		
5 8 44 22	I. Tr. I.	23 43 36	III. Tr. E.	22 21 22	II. Tr. E.		
10 1 5	I. Sh. I.						
10 54 24	I. Tr. E.	14 2 50 18	III. Sh. I.	23 0 35 25	II. Sh. E.		
12 9 48	I.*Sh. E.	4 27 36	III. Sh. E.	4 32 37	I. Oc. D.		
19 4 13	II. Oc. D.	5 12 43	I. Tr. I.	7 51 49	I. Ec. R.		
		6 25 48	I. Sh. I.				
6 0 14 1	II. Ec. R.	7 22 57	I. Tr. E.	23 1 42 5	I. Tr. I.		
6 4 30	I. Oc. D.	8 34 39	I. Sh. E.	2 50 24	I. Sh. I.		
9 31 55	I. Ec. R.	17 0 45	II. Tr. I.	3 52 32	I. Tr. E.		
17 23 57	III. Tr. I.	19 28 16	II. Sh. I.	4 59 25	I. Sh. E.		
19 28 5	III. Tr. E.	19 36 26	II. Tr. E.	13 56 42	II.*Oc. D.		
22 47 38	III. Sh. I.	21 58 35	II. Sh. E.	18 49 7	II. Ec. R.		
				23 2 34	I. Oc. D.		
7 0 25 14	III. Sh. E.	15 2 33 4	I. Oc. D.				
3 13 59	I. Tr. I.	5 56 22	I. Ec. R.	24 2 20 38	I. Ec. R.		
4 30 4	I. Sh. I.	23 42 27	I. Tr. I.	16 3 21	III. Oc. D.		
5 24 2	I. Tr. E.			18 10 38	III. Oc. R.		
6 38 47	I. Sh. E.	16 0 54 41	I. Sh. I.	20 12 9	I. Tr. I.		
14 16 58	II.*Tr. I.	1 52 44	I. Tr. E.	20 48 43	III. Ec. D.		
16 51 5	II. Sh. I.	3 3 33	I. Sh. E.	21 19 23	I. Sh. I.		
16 52 39	II. Tr. E.	11 10 32	II. Oc. D.	22 22 39	I. Tr. E.		
19 21 32	II. Sh. E.	16 11 5	II. Ec. R.	22 28 49	III. Ec. R.		
		21 2 52	I. Oc. D.	23 28 27	I. Sh. E.		
8 0 34 10	I. Oc. D.						
4 0 51	I. Ec. R.	17 0 25 13	I. Ec. R.	25 9 8 47	II. Tr. I.		
21 43 32	I. Tr. I.	11 44 29	III.*Oc. D.	11 23 40	II. Sh. I.		
22 58 57	I. Sh. I.	13 51 46	III.*Oc. R.	11 44 19	II.*Tr. E.		
23 53 38	I. Tr. E.	16 47 1	III. Ec. D.	13 53 49	II.*Sh. E.		
		18 12 21	I. Tr. I.	17 32 36	I. Oc. D.		
9 1 7 42	I. Sh. E.	18 27 21	III. Ec. R.	20 49 30	I. Ec. R.		
8 25 59	II. Oc. D.	19 23 40	I. Sh. I.				
13 33 9	II.*Ec. R.	20 22 41	I. Tr. E.	26 14 42 10	I.*Tr. I.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation  
 Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

## GREENWICH MEAN TIME.

FEBRUARY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

<p>I.  * r</p>	<p>III.  * d * r</p>
<p>II.  * r</p>	<p>IV. No Eclipse. </p>

*Configurations at 13<sup>h</sup> 30<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	.3 4.2 ○ 1.	
2	4. .3 .1 ○ .2	
3	4. 1 ○ . <sup>2</sup> / <sub>3</sub>	
4	4. 2. ○ .3	.1 ●
5	.4 . <sup>1</sup> / <sub>2</sub> ○ 3.	
6	.4 ○ 3 1 2	
7	.4 3. 1. 2 ○ .	
8	.3 .2 .4 ○ 1.	
9	.3 .1 ○ .4	.2 ●
10	○ 1. 2. .4	.3 ●
11	2. .○ <sub>1</sub> .3 .4	
12	.2 1. ○ 3. .4	
13	○ . <sup>2</sup> / <sub>1</sub> .2 4.	
14	3. 1. ○ 2. 4.	
15	3. 2. ○ .1 4.	
16	.3 .1 ○ 4.	.2 ●
17	4. ○ 1. 2.	.3 ●
18	4. 2. 1 ○ .3	
19	○ 1. 4. .2 ○ 3.	
20	4. ○ .1 . <sup>2</sup> / <sub>2</sub>	
21	.4 . <sup>2</sup> / <sub>1</sub> ○ 2.	
22	.4 3. 2. ○ 1	
23	.4 .3 .1 .○ 2	
24	.4 .○ 3 1. 2.	
25	. <sup>2</sup> / <sub>1</sub> .○ 4 .3	
26	.2 1 ○ .4 3.	
27	○ .2 3. .4	.1 ●
28	. <sup>2</sup> / <sub>1</sub> ○ 2. 4.	



## GREENWICH MEAN TIME.

## MARCH.

d h m s		d h m s		d h m s		d h m s	
1 041 59	II. Sh. I.	9 19 33 8	II. Oc. D.	18 51 54	I. Sh. E.	26 4 30 16	I. Ec. R.
1 7 23	II. Tr. E.			7 21 36	III. Oc. R.	22 47 0	I. Tr. I.
3 12 7	II. Sh. E.	10 0 52 26	II. Ec. R.	8 54 40	III. Ec. D.	23 30 48	I. Sh. I.
6 32 44	I. Oc. D.	3 3 30	I. Oc. D.	10 34 23	III. Ec. R.		
9 47 11	I. Ec. R.	6 11 15	I. Ec. R.	17 30 46	II. Tr. I.	27 0 58 5	I. Tr. E.
				19 12 54	II. Sh. I.	1 40 30	I. Sh. E.
2 3 42 20	I. Tr. I.	11 0 13 28	I. Tr. I.	20 5 48	II. Tr. E.	14 39 22	II. Oc. D.
4 46 6	I. Sh. I.	0 49 39	III. Oc. D.	21 42 54	II. Sh. E.	18 40 39	II. Ec. R.
5 52 57	I. Tr. E.	1 10 45	I. Sh. I.	23 34 52	I. Oc. D.	20 6 39	I. Oc. D.
6 55 16	I. Sh. E.	2 24 16	I. Tr. E.			22 59 0	I. Ec. R.
16 44 16	II. Oc. D.	2 56 11	III. Oc. R.	19 2 35 12	I. Ec. R.		
21 27 14	II. Ec. R.	3 20 7	I. Sh. E.	20 45 11	I. Tr. I.	28 17 17 34	I. Tr. I.
		4 52 56	III. Ec. D.	21 35 14	I. Sh. I.	17 59 44	I. Sh. I.
3 1 2 48	I. Oc. D.	6 32 42	III. Ec. R.	22 56 9	I. Tr. E.	19 28 39	I. Tr. E.
4 15 59	I. Ec. R.	14 42 41	II. Tr. I.	23 44 48	I. Sh. E.	20 9 28	I. Sh. E.
20 25 5	III. Oc. D.	16 36 40	II. Sh. I.				
22 12 33	I. Tr. I.	17 17 55	II. Tr. E.	20 11 48 4	II. Oc. D.	29 0 1 47	III. Tr. I.
22 32 5	III. Oc. R.	19 6 42	II. Sh. E.	16 2 23	II. Ec. R.	2 4 42	III. Tr. E.
23 15 5	I. Sh. I.	21 33 44	I. Oc. D.	18 5 11	I. Oc. D.	3 2 22	III. Sh. I.
				21 3 58	I. Ec. R.	4 39 26	III. Sh. E.
4 0 23 12	I. Tr. E.	12 0 40 3	I. Ec. R.			9 43 53	II. Tr. I.
0 50 33	III. Ec. D.	18 43 44	I. Tr. I.	21 15 15 40	I. Tr. I.	11 6 51	II. Sh. I.
1 24 18	I. Sh. E.	19 39 37	I. Sh. I.	16 4 10	I. Sh. I.	12 18 33	II.*Tr. E.
2 30 28	III. Ec. R.	20 54 34	I. Tr. E.	17 26 39	I. Tr. E.	13 36 48	II. Sh. E.
11 55 19	II.*Tr. I.	21 49 2	I. Sh. E.	18 13 46	I. Sh. E.	14 37 6	I. Oc. D.
14 0 17	II.*Sh. I.			19 33 24	III. Tr. I.	17 27 46	I. Ec. R.
14 30 44	II.*Tr. E.	13 8 57 40	II. Oc. D.	21 37 3	III. Tr. E.		
16 30 22	II. Sh. E.	13 24 10	II.*Ec. R.	23 0 47	III. Sh. I.	30 11 48 0	I. Tr. I.
19 32 57	I. Oc. D.	16 3 58	I. Oc. D.			12 28 33	I.*Sh. I.
22 44 49	I. Ec. R.	19 8 50	I. Ec. R.	22 0 37 48	III. Sh. E.	13 59 8	I. Tr. E.
				6 55 0	II. Tr. I.	14 38 19	I. Sh. E.
5 16 42 42	I. Tr. I.	14 13 14 6	I.*Tr. I.	8 30 56	II. Sh. I.		
17 43 58	I. Sh. I.	14 8 34	I. Sh. I.	9 29 56	II. Tr. E.	31 4 5 38	II. Oc. D.
18 53 24	I. Tr. E.	15 6 34	III. Tr. I.	11 0 55	II. Sh. E.	8 0 10	II. Ec. R.
19 53 13	I. Sh. E.	15 24 58	I. Tr. E.	12 35 34	I.*Oc. D.	9 7 30	I. Oc. D.
		16 18 1	I. Sh. E.	15 32 45	I. Ec. R.	11 56 30	I. Ec. R.
6 6 8 18	II. Oc. D.	17 10 50	III. Tr. E.				
10 46 0	II. Ec. R.	18 59 9	III. Sh. I.	23 9 46 2	I. Tr. I.		
14 3 5	I.*Oc. D.	20 36 9	III. Sh. E.	10 33 0	I. Sh. I.		
17 13 37	I. Ec. R.			11 57 4	I.*Tr. E.		
				12 42 38	I.*Sh. E.		
7 10 41 27	III. Tr. I.	15 4 6 38	II. Tr. I.				
11 12 57	I. Tr. I.	5 54 49	II. Sh. I.	24 1 13 58	II. Oc. D.		
12 12 55	I.*Sh. I.	6 41 47	II. Tr. E.	5 21 54	II. Ec. R.		
12 46 7	III.*Tr. E.	8 24 51	II. Sh. E.	7 5 54	I. Oc. D.		
13 23 40	I.*Tr. E.	10 34 17	I. Oc. D.	10 1 31	I. Ec. R.		
14 22 13	I.*Sh. E.	13 37 39	I.*Ec. R.				
14 57 21	III. Sh. I.	16 7 44 23	I. Tr. I.	25 4 16 34	I. Tr. I.		
16 34 21	III. Sh. E.	8 37 24	I. Sh. I.	5 1 57	I. Sh. I.		
		9 55 18	I. Tr. E.	6 27 37	I. Tr. E.		
8 1 18 53	II. Tr. I.	10 46 54	I. Sh. E.	7 11 37	I. Sh. E.		
3 18 29	II. Sh. I.	22 23 4	II. Oc. D.	9 43 39	III. Oc. D.		
3 54 13	II. Tr. E.			11 48 48	III. Oc. R.		
5 48 34	II. Sh. E.	17 2 43 38	II. Ec. R.	12 56 30	III.*Ec. D.		
8 33 19	I. Oc. D.	5 4 33	I. Oc. D.	14 36 14	III. Ec. R.		
11 42 28	I.*Ec. R.	8 6 26	I. Ec. R.	20 19 23	II. Tr. I.		
				21 48 54	II. Sh. I.		
9 5 43 7	I. Tr. I.	18 2 14 50	I. Tr. I.	22 54 11	II. Tr. E.		
6 41 46	I. Sh. I.	3 6 23	I. Sh. I.				
7 53 54	I. Tr. E.	4 25 46	I. Tr. E.	26 0 18 52	II. Sh. E.		
8 51 6	I. Sh. E.	5 15 42	III. Oc. D.	1 36 17	I. Oc. D.		




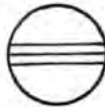
NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

\*Visible at Washington.

## GREENWICH MEAN TIME.

MARCH.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.		* r	III.		* d	* r
II.		* r	IV. No Eclipse.			

*Configurations at 13<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.				East.			
1		3.	2.	○	1		4	
2		3	1.	2	○		4.	
3			3	○	1.	2		4.
4	○ 2.		1	○		3		4.
5			2	○	1.	4.		3
6			4.	○ 1	2		3.	
7	○ 1.		4.	3	○		2.	
8		4.	3.	2.	○	1		
9		4.	3	1.	○			
10		4		3	○	1	2	
11		4		1	2	○	3	
12		4	2.	○	1.		3	
13			4	1	○		3.	2 ●
14				1	○ 3		2.	
15			3.	2.	○		4	1 ●
16		3		2	1.	○		4
17			3	○	1	2		4
18			1.	○	3			4
19			2.	○	1.	3		4.
20				1	○		3.	4.
21					○ 1.	2.	4.	
22			3.	2.	○	4.		
23			3.	24.	1.	○		
24			4.	3	○	1	2	
25		4.		1.	○	2.		3 ●
26		4.		2.	○	1	3	
27		4		1	○ 2		3.	
28		4			○	1	3.	2
29			4	3.	1.	○		
30	○ 1.		3.	4	○			
31			3		○	1	2	

## GREENWICH MEAN TIME.

## APRIL.


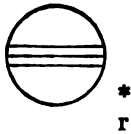

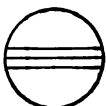
d h m s		d h m s		d h m s		d h m s	
1 618 36	I. Tr. I.	5 19 22 41	I. Ec. R.	11 23 33 22	I. Tr. E.	17 51 17 10	I. Sh. I.
6 57 29	I. Sh. I.					7 5 13	I. Tr. E.
8 29 45	I. Tr. E.	6 13 50 15	I. Tr. I.	12 0 0 39	I. Sh. E.	7 27 12	I. Sh. E.
9 7 17	I. Sh. E.	14 24 2	I. Sh. I.	9 3 1	III. Tr. I.	23 16 55	II. Oc. D.
14 12 12	III. Oc. D.	16 1 26	I. Tr. E.	11 4 11	III. Tr. E.		
16 16 30	III. Oc. R.	16 33 55	I. Sh. E.	11 6 13	III. Sh. I.	18 2 12 3	I. Oc. D.
16 57 32	III. Ec. D.			12 43 33	III. *Sh. E.	2 35 22	II. Ec. R.
18 37 19	III. Ec. R.	7 6 57 57	II. Oc. D.	15 22 40	II. Tr. I.	4 43 33	I. Ec. R.
23 8 28	II. Tr. I.	10 38 26	II. Ec. R.	16 18 9	II. Sh. I.	23 24 41	I. Tr. I.
		11 9 15	I. Oc. D.	17 56 44	II. Tr. E.	23 46 3	I. Sh. I.
2 0 24 44	II. Sh. I.	13 51 24	I. Ec. R.	18 40 38	I. Oc. D.		
1 43 0	II. Tr. E.			18 48 1	II. Sh. E.	19 1 35 56	I. Tr. E.
2 54 40	II. Sh. E.	8 8 20 54	I. Tr. I.	21 17 30	I. Ec. R.	1 56 7	I. Sh. E.
3 37 55	I. Oc. D.	8 52 58	I. Sh. I.			13 35 12	III. Tr. I.
6 25 14	I. Ec. R.	10 32 7	I. Tr. E.	18 15 52 41	I. Tr. I.	15 8 16	III. Sh. I.
		11 2 53	I. Sh. E.	16 19 27	I. Sh. I.	15 35 26	III. Tr. E.
3 0 49 7	I. Tr. I.	18 41 41	III. Oc. D.	18 3 55	I. Tr. E.	16 45 50	III. Sh. E.
1 26 20	I. Sh. I.	20 45 3	III. Oc. R.	18 29 27	I. Sh. E.	18 12 25	II. Tr. I.
3 0 17	I. Tr. E.	20 58 22	III. Ec. D.			18 53 34	II. Sh. I.
3 36 9	I. Sh. E.	22 38 15	III. Ec. R.	14 9 50 47	II. Oc. D.	20 42 33	I. Oc. D.
17 31 21	II. Oc. D.			13 11 7	I. Oc. D.	20 46 8	II. Tr. E.
21 18 54	II. Ec. R.	9 1 57 51	II. Tr. I.	13 16 42	II. Ec. R.	21 23 23	II. Sh. E.
22 8 20	I. Oc. D.	3 0 22	II. Sh. I.	15 46 12	I. Ec. R.	23 12 14	I. Ec. R.
		4 32 5	II. Tr. E.				
4 0 53 56	I. Ec. R.	5 30 17	II. Sh. E.	15 10 23 22	I. Tr. I.	20 17 55 15	I. Tr. I.
19 19 44	I. Tr. I.	5 39 42	I. Oc. D.	10 48 23	I. Sh. I.	18 14 49	I. Sh. I.
19 55 14	I. Sh. I.	8 20 6	I. Ec. R.	12 34 37	I. *Tr. E.	20 6 30	I. Tr. E.
21 30 55	I. Tr. E.			12 58 23	I. Sh. E.	20 24 53	I. Sh. E.
22 5 6	I. Sh. E.	10 2 51 28	I. Tr. I.	23 12 6	III. Oc. D.		
		3 21 47	I. Sh. I.			21 12 43 58	II. Oc. D.
5 4 32 4	III. Tr. I.	5 2 41	I. Tr. E.	16 2 39 16	III. Ec. R.	15 13 2	I. Oc. D.
6 34 8	III. Tr. E.	5 31 43	I. Sh. E.	4 47 30	II. Tr. I.	15 54 54	II. Ec. R.
7 4 31	III. Sh. I.	20 23 55	II. Oc. D.	5 35 50	II. Sh. I.	17 40 55	I. Ec. R.
8 41 40	III. Sh. E.	23 57 10	II. Ec. R.	7 21 24	II. Tr. E.		
12 33 9	II. *Tr. I.			7 41 35	I. Oc. D.	22 12 25 58	I. Tr. I.
13 42 36	II. Sh. I.	11 0 10 9	I. Oc. D.	8 5 42	II. Sh. E.	12 43 43	I. Sh. I.
15 7 32	II. Tr. E.	2 48 47	I. Ec. R.	10 14 52	I. Ec. R.	14 37 13	I. Tr. E.
16 12 31	II. Sh. E.	21 22 8	I. Tr. I.			14 53 48	I. Sh. E.
16 38 48	I. Oc. D.	21 50 41	I. Sh. I.	17 4 53 58	I. Tr. I.		

By reason of the proximity of Jupiter to the Sun the phenomena of the satellites are not given from April 23 to May 31.

GREENWICH MEAN TIME.

APRIL.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.		III.	
II.		IV. No Eclipse.	

*Configurations at 12<sup>h</sup> 45<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	1. • O 3	2. • 4
2	2. • O	• 1 • 3 • 4
3	• 1 • 2 O	3. • 4
4	O	1. • 3. 4 • 4
5	O 2. • 1 O	4.
6	3. • 2 1 O •	4.
7	• 3 O • 2	4. • 1 ●
8	• 1 • 3 O 4. 2.	
9	4. • 2. O • 1 • 3	
10	4. • 1. 3 O	• 3
11	4. • O 1. • 3.	
12	4. • 1 3 • O 2.	
13	• 4 • 3 • 2. O 1.	
14	• 4 • 3 • O 1	• 2 ●
15	• 4 • 3 1 • O 2.	
16	• 4 • 3 O • 1 • 3	
17	• 1. • O • 4 • 3	
18	O • 1 • 3 • 4	
19	• 1 • 3 O 2.	• 4
20	3 • 2. O 1.	• 4
21	• 3 • 1 O	4. • 2 ●
22	O 1. • 3 O 2.	4.

## GREENWICH MEAN TIME.

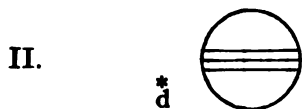
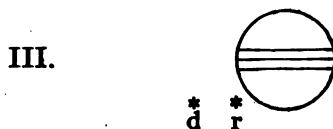
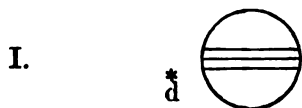
JUNE.

d h m s		d h m s		d h m s		d h m s	
1 8 29 21	I. Ec. D.	8 23 11 2	III. Tr. E.	17 10 25 55	II. Ec. D.	26 6 5 47	I. Oc. R.
10 23 29	II. Sh. I.			14 18 53	II. Oc. R.	7 25 17	II. Sh. I.
11 3 8	I. Oc. R.	9 7 40 17	I. Sh. I.			8 59 4	II. Tr. I.
11 10 13	II. Tr. I.	8 11 58	I. Tr. I.	18 4 3 48	I. Sh. I.	9 54 13	II. Sh. E.
12 52 51	II. Sh. E.	9 50 16	I. Sh. E.	4 43 52	I. Tr. I.	11 28 51	II. Tr. E.
13 41 33	II. Tr. E.	10 22 38	I. Tr. E.	6 13 38	I. Sh. E.	17 5 16	III. Ec. D.
15 14 52	III. Sh. I.			6 54 19	I. Tr. E.	18 48 59	III. Ec. R.
16 46 35	III. Tr. I.	10 45 2 2	I. Ec. D.			20 14 50	III. *Oc. D.
16 54 22	III. Sh. E.	7 34 32	I. Oc. R.	19 1 14 35	I. Ec. D.	22 8 52	III. Oc. R.
18 41 10	III. Tr. E.	7 48 28	II. Ec. D.	4 5 25	I. Oc. R.		
		11 28 1	II. Oc. R.	4 50 28	II. Sh. I.	27 0 27 5	I. Sh. I.
2 5 45 26	I. Sh. I.			6 11 27	II. Tr. I.	1 15 3	I. Tr. I.
6 10 8	I. Tr. I.	11 2 9 3	I. Sh. I.	7 19 32	II. Sh. E.	2 36 47	I. Sh. E.
7 55 29	I. Sh. E.	2 42 26	I. Tr. I.	8 41 40	II. Tr. E.	3 25 15	I. Tr. E.
8 20 57	I. Tr. E.	4 18 59	I. Sh. E.	13 5 6	III. Ec. D.	21 37 3	I. Ec. D.
		4 53 4	I. Tr. E.	14 48 15	III. Ec. R.		
3 2 57 55	I. Ec. D.	23 20 33	I. Ec. D.	15 48 6	III. Oc. D.	28 0 35 49	I. Oc. R.
5 10 53	II. Ec. D.			17 42 41	III. Oc. R.	2 21 18	II. Ec. D.
5 33 28	I. Oc. R.	12 2 4 44	I. Oc. R.	22 32 26	I. Sh. I.	6 33 15	II. Oc. R.
8 36 32	II. Oc. R.	2 15 43	II. Sh. I.	23 14 7	I. Tr. I.	18 55 48	I. Sh. I.
4 0 14 13	I. Sh. I.	3 23 19	II. Tr. I.			19 45 17	I. Tr. I.
0 40 40	I. Tr. I.	4 44 54	II. Sh. E.	20 0 42 15	I. Sh. E.	21 5 28	I. *Sh. E.
2 24 15	I. Sh. E.	5 53 58	II. Tr. E.	1 24 31	I. Tr. E.	21 55 26	I. Tr. E.
2 51 28	I. Tr. E.	9 4 16	III. Ec. D.	19 43 5	I. Ec. D.		
21 26 26	I. Ec. D.	10 46 56	III. Ec. R.	22 35 33	I. Oc. R.	29 16 5 31	I. Ec. D.
23 40 54	II. Sh. I.	11 19 23	III. Oc. D.	23 44 8	II. Ec. D.	19 5 48	I. *Oc. R.
		13 14 38	III. Oc. R.			20 42 39	II. *Sh. I.
		20 37 42	I. Sh. I.	21 3 43 38	II. Oc. R.	22 22 36	II. Tr. I.
5 0 3 45	I. Oc. R.	21 12 47	I. Tr. I.	17 1 10	I. Sh. I.	23 11 33	II. Sh. E.
0 34 41	II. Tr. I.	22 47 37	I. Sh. E.	17 44 28	I. Tr. I.		
2 10 13	II. Sh. E.	23 23 22	I. Tr. E.	19 10 58	I. Sh. E.	30 0 52 12	II. Tr. E.
3 5 47	II. Tr. E.			19 54 49	I. Tr. E.	7 17 9	III. Sh. I.
5 4 1	III. Ec. D.	13 17 49 3	I. Ec. D.			8 58 42	III. Sh. E.
6 46 12	III. Ec. R.	20 34 56	I. Oc. R.	22 14 11 34	I. Ec. D.	10 39 54	III. Tr. I.
6 50 15	III. Oc. D.	21 6 46	II. *Ec. D.	17 5 38	I. Oc. R.	12 31 40	III. Tr. E.
8 46 11	III. Oc. R.			18 7 51	II. Sh. I.	13 24 22	I. Sh. I.
18 42 53	I. Sh. I.	14 0 53 8	II. Oc. R.	19 35 18	II. Tr. I.	14 15 21	I. Tr. I.
19 11 6	I. Tr. I.	15 6 27	I. Sh. I.	20 36 51	II. *Sh. E.	15 34 1	I. Sh. E.
20 52 54	I. Sh. E.	15 43 13	I. Tr. I.	22 5 19	II. Tr. E.	16 25 26	I. Tr. E.
21 21 51	I. Tr. E.	17 16 21	I. Sh. E.				
		17 53 45	I. Tr. E.	23 3 16 58	III. Sh. I.		
6 15 54 58	I. Ec. D.			4 58 0	III. Sh. E.		
18 29 15	II. Ec. D.	15 12 17 34	I. Ec. D.	6 13 47	III. Tr. I.		
18 34 1	I. Oc. R.	15 5 6	I. Oc. R.	8 6 13	III. Tr. E.		
22 1 56	II. Oc. R.	15 33 5	II. Sh. I.	11 29 46	I. Sh. I.		
		16 47 25	II. Tr. I.	12 14 39	I. Tr. I.		
7 13 11 39	I. Sh. I.	18 2 12	II. Sh. E.	13 39 32	I. Sh. E.		
13 41 36	I. Tr. I.	19 17 53	II. Tr. E.	14 24 56	I. Tr. E.		
15 21 39	I. Sh. E.	23 16 41	III. Sh. I.				
15 52 19	I. Tr. E.			24 8 40 5	I. Ec. D.		
8 10 23 30	I. Ec. D.	16 0 57 11	III. Sh. E.	11 35 45	I. Oc. R.		
12 58 19	II. Sh. I.	1 46 13	III. Tr. I.	13 3 9	II. Ec. D.		
13 4 16	I. Oc. R.	3 39 20	III. Tr. E.	17 8 55	II. Oc. R.		
13 59 2	II. Tr. I.	9 35 4	I. Sh. I.				
15 27 33	II. Sh. E.	10 13 30	I. Tr. I.	25 5 58 28	I. Sh. I.		
16 29 56	II. Tr. E.	11 44 57	I. Sh. E.	6 44 54	I. Tr. I.		
19 16 6	III. Sh. I.	12 23 59	I. Tr. E.	8 8 12	I. Sh. E.		
20 56 6	III. Sh. E.			8 55 9	I. Tr. E.		
21 17 12	III. Tr. I.	17 6 46 5	I. Ec. D.				
		9 35 18	I. Oc. R.	26 3 8 34	I. Ec. D.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \*Visible at Washington.

## GREENWICH MEAN TIME.

JUNE.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.**Configurations at 20<sup>h</sup> 45<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	4. 2. 3. ○ 1.	
2	4. 3. 1. ○	
3	4. 3. ○ 1. 2	
4	4. 3. ○ 12.	
5	○ 1. 4. ○ 3	
6		○ 1. 3. 2. ●
7		1. ○ 3. 4.
8		2. ○ 1. 4.
9	3. 2. 1. ○	4.
10	3. ○ 1. 2	4.
11	3. 1. ○ 2.	4.
12	2. 1. ○ 3	4.
13	1. ○ 3. 4.	
14	1. ○ 4. 2. 3.	
15	4. 2. ○ 3. 1	
16	4. 3. 2. 1. ○	
17	4. 3. ○ 1.	
18	4. 3. 1. ○ 2.	
19	4. 2. ○ 1.	
20	4. 2. ○ 3	1. ●
21	4. 1. ○ 2. 3.	
22	4. 1. ○ 3.	
23	4. 1. ○ 4.	
24	3. ○ 2. 1. 4.	
25	3. 1. ○ 2. 4.	
26	2. ○ 1. 4.	3. ●
27	2. 1. ○ 3. 4.	
28	○ 1. 2. 3. 4.	
29	○ 1. 3. 4.	
30	2. 1. ○ 4.	

## GREENWICH MEAN TIME.

## JULY.

d h m s		d h m s		d h m s		d h m s	
11 034 1	I. Ec. D.	10 10 518	I. Oc. R.	18 9 2346	III. Oc. D.	27 4 4237	I. Sh. E.
13 35 49	I. Oc. R.	12 34 56	II. Sh. I.	9 24 25	I. Tr. E.	5 52 33	I. Tr. E.
15 40 13	II. Ec. D.	14 32 13	II. Tr. I.	11 16 30	III. Oc. R.	23 40 53	I. Ec. D.
19 58 2	II.*Oc. R.	15 3 39	II. Sh. E.				
		17 1 9	II. Tr. E.	19 3 18 39	I. Ec. D.	28 3 1 54	I. Oc. R.
2 7 53 4	I. Sh. I.			6 34 3	I. Oc. R.	7 2 19	II. Sh. I.
8 45 29	I. Tr. I.	11 1 4 58	III. Ec. D.	10 11 47	II. Ec. D.	9 23 55	II. Tr. I.
10 2 40	I. Sh. E.	2 50 1	III. Ec. R.	14 55 49	II. Oc. R.	9 30 49	II. Sh. E.
10 55 31	I. Tr. E.	4 16 8	I. Sh. I.			11 51 52	II. Tr. E.
		5 2 58	III. Oc. D.	20 0 39 11	I. Sh. I.	21 1 58	I.*Sh. I.
3 5 2 29	I. Ec. D.	5 15 28	I. Tr. I.	1 14 40	I. Tr. I.	22 12 44	I. Tr. I.
8 5 45	I. Oc. R.	6 25 35	I. Sh. E.	2 48 27	I. Sh. E.	23 11 5	I. Sh. E.
10 0 5	II. Sh. I.	6 56 6	III. Oc. R.	3 54 11	I. Tr. E.	23 18 26	III. Sh. I.
11 46 0	II. Tr. I.	7 25 15	I. Tr. E.	21 47 5	I. Ec. D.		
12 28 55	II. Sh. E.					29 0 21 59	I. Tr. E.
14 15 22	II. Tr. E.	12 1 24 50	I. Ec. D.	21 1 3 40	I. Oc. R.	1 2 35	III. Sh. E.
21 5 29	III.*Ec. D.	4 35 7	I. Oc. R.	4 27 18	II. Sh. I.	4 6 11	III. Tr. I.
22 49 51	III. Ec. R.	7 35 9	II. Ec. D.	6 39 59	II. Tr. I.	5 55 53	III. Tr. E.
		12 9 28	II. Oc. R.	6 55 53	II. Sh. E.	18 9 21	I. Ec. D.
4 0 40 6	III. Oc. D.	22 44 49	I. Sh. I.	9 8 19	II. Tr. E.	21 31 24	I.*Oc. R.
2 21 39	I. Sh. I.	23 45 26	I. Tr. I.	19 7 42	I.*Sh. I.		
2 33 40	III. Oc. R.			19 18 1	III.*Sh. I.	30 2 6 37	II. Ec. D.
3 15 31	I. Tr. I.	13 0 54 13	I. Sh. E.	20 14 19	I.*Tr. I.	7 2 56	II. Oc. R.
4 31 14	I. Sh. E.	1 155 9	I. Tr. E.	21 1 25	III.*Sh. E.	15 30 33	I. Sh. I.
5 25 30	I. Tr. E.	19 53 16	I.*Ec. D.	21 16 56	I.*Sh. E.	16 42 15	I. Tr. I.
23 30 57	I. Ec. D.	23 4 52	I. Oc. R.	22 23 46	I. Tr. E.	17 39 38	I. Sh. E.
				23 47 53	III. Tr. I.	18 51 27	I.*Tr. E.
5 2 35 41	I. Oc. R.	14 1 52 23	II. Sh. I.				
4 58 20	II. Ec. D.	3 55 3	II. Tr. I.	22 1 38 2	III. Tr. E.	31 12 37 47	I. Ec. D.
9 21 55	II. Oc. R.	4 21 3	II. Sh. E.	16 15 34	I. Ec. D.	16 0 48	I. Oc. R.
20 50 21	I.*Sh. I.	6 23 48	II. Tr. E.	19 33 20	I.*Oc. R.	20 19 47	II.*Sh. I.
21 45 37	I. Tr. I.	15 17 53	III. Sh. I.	23 30 19	II. Ec. D.	22 45 12	II. Tr. I.
22 59 53	I. Sh. E.	17 0 36	III. Sh. E.			22 48 16	II. Sh. E.
23 55 33	I. Tr. E.	17 13 21	I. Sh. I.	23 4 18 43	II. Oc. R.		
		18 15 14	I. Tr. I.	13 36 19	I. Sh. I.		
6 17 59 25	I. Ec. D.	19 22 43	I.*Sh. E.	14 44 1	I. Tr. I.		
21 5 34	I.*Oc. R.	19 27 24	III.*Tr. I.	15 45 31	I. Sh. E.		
23 17 29	II. Sh. I.	20 24 54	I.*Tr. E.	16 53 25	I. Tr. E.		
		21 18 3	III.*Tr. E.				
7 1 9 11	II. Tr. I.			24 10 44 0	I. Ec. D.		
1 46 15	II. Sh. E.	15 14 21 46	I. Ec. D.	14 2 53	I. Oc. R.		
3 38 22	II. Tr. E.	17 34 40	I. Oc. R.	17 44 45	II. Sh. I.		
11 17 14	III. Sh. I.	20 53 48	II.*Ec. D.	20 2 0	II.*Tr. I.		
12 59 21	III. Sh. E.			20 13 18	II.*Sh. E.		
15 4 17	III. Tr. I.	16 1 33 3	II. Oc. R.	22 30 9	II. Tr. E.		
15 18 54	I. Sh. I.	11 41 59	I. Sh. I.				
16 15 34	I. Tr. I.	12 45 6	I. Tr. I.	25 8 4 51	I. Sh. I.		
16 55 28	III. Tr. E.	13 51 19	I. Sh. E.	9 3 52	III. Ec. D.		
17 28 25	I. Sh. E.	14 54 43	I. Tr. E.	9 13 37	I. Tr. I.		
18 25 27	I. Tr. E.			10 14 1	I. Sh. E.		
		17 8 50 12	I. Ec. D.	10 50 19	III. Ec. R.		
8 12 27 55	I. Ec. D.	12 4 22	I. Oc. R.	11 22 57	I. Tr. E.		
15 35 28	I. Oc. R.	15 9 49	II. Sh. I.	13 42 40	III. Oc. D.		
18 17 6	II. Ec. D.	17 17 36	II. Tr. I.	15 34 58	III. Oc. R.		
22 46 8	II. Oc. R.	17 38 26	II. Sh. E.				
		19 46 8	II.*Tr. E.				
9 9 47 34	I. Sh. I.			26 5 12 28	I. Ec. D.		
10 45 34	I. Tr. I.	18 5 4 19	III. Ec. D.	8 32 26	I. Oc. R.		
11 57 2	I. Sh. E.	6 10 32	I. Sh. I.	12 48 13	II. Ec. D.		
12 55 23	I. Tr. E.	6 50 4	III. Ec. R.	17 40 47	II. Oc. R.		
		7 14 51	I. Tr. I.				
10 6 56 22	I. Ec. D.	8 19 51	I. Sh. E.	27 2 33 28	I. Sh. I.		
				3 43 15	I. Tr. I.		

NOTE.—I. denotes Ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

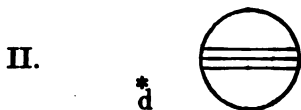
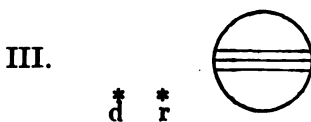
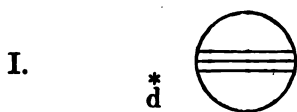
\*Visible at Washington.



GREENWICH MEAN TIME.

JULY.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*



*Configurations at 20<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	3.	○ 24. 1
2	.3 .4 1.	○ 2.
3	4. 2. 3	○ 1.
4	4. 2. 1	○ .3
5	4. 1.	○ 1. 2. 3
6	.4	○ 2. 3. 1 ●
7	.4 2. 1.	○
8	.4 3.	○ .1 2 ●
9	.3 1.	○ 2.
10	.3 1.	○ .4 1.
11	.2 1	○ .3 .4
12		○ 1. 2. 3. 4
13		○ 2. 3. 4 1 ●
14	○ 3. ○ 1. 2.	○ .4
15	3. 2	○ 1. 4.
16	.3 1.	○ 2. 4.
17	.3 2.	○ 1. 4.
18	.2 1	○ 4. 3
19	4.	○ 1. 3
20	4. 1	○ 2. 3.
21	○ 1. 4.	○ 3.
22	4. 3. 2	○ 1
23	.4 .3 1.	○ 2
24	○ 2. .4 .3	○ .1
25	.4 .2 1.	○ 3
26	.4	○ 2 1. 3
27	.1	○ .4 2. 3.
28	2.	○ 1. 3. 4
29	3. 2	○ .4 1 ●
30	3. 1.	○ 2. 4
31	.3	○ 2. 1 4.

## GREENWICH MEAN TIME.

## AUGUST.

d h m s		d h m s		d h m s		d h m s	
1 113 8	II. Tr. E.	8 22 1338	III. Oc. D.	16 20 36 21	II.*Ec. D.	24 10 9 41	I. Sh. I.
9 59 4	I. Sh. I.			23 6 50	II. Ec. R.	11 29 54	I. Tr. I.
11 11 40	I. Tr. I.	9 0 5 4	III. Oc. R.	23 17 40	II. Oc. D.	12 18 27	I. Sh. E.
12 8 6	I. Sh. E.	9 0 0	I. Ec. D.			13 38 30	I. Tr. E.
13 3 35	III. Ec. D.	12 27 17	I. Oc. R.	17 1 46 23	II. Oc. R.		
13 20 49	I. Tr. E.	18 0 30	II.*Ec. D.	8 15 46	I. Sh. I.	25 7 15 55	I. Ec. D.
14 50 46	III. Ec. R.	20 31 5	II.*Ec. R.	9 34 31	I. Tr. I.	10 47 50	I. Oc. R.
17 59 13	III. Oc. D.	20 37 5	II.*Oc. D.	10 24 35	I. Sh. E.	17 23 7	II.*Sh. I.
19 51 5	III.*Oc. R.	23 6 13	II. Oc. R.	11 43 16	I. Tr. E.	19 51 37	II.*Sh. E.
						20 6 49	II.*Tr. I.
						22 33 31	II. Tr. E.
2 7 6 14	I. Ec. D.	10 6 21 45	I. Sh. I.	18 5 22 9	I. Ec. D.		
10 30 12	I. Oc. R.	7 38 14	I. Tr. I.	8 52 32	I. Oc. R.		
15 24 27	II. Ec. D.	8 30 40	I. Sh. E.	14 47 47	II. Sh. I.	26 4 38 6	I. Sh. I.
20 24 17	II.*Oc. R.	9 47 9	I. Tr. E.	17 16 14	II.*Sh. E.	5 58 32	I. Tr. I.
				17 28 20	II.*Tr. I.	6 46 52	I. Sh. E.
				19 55 17	II.*Tr. E.	8 7 8	I. Tr. E.
3 4 27 39	I. Sh. I.	11 3 28 24	I. Ec. D.			15 16 36	III. Sh. I.
5 41 7	I. Tr. I.	6 56 24	I. Oc. R.	19 2 44 11	I. Sh. I.	17 4 2	III.*Sh. I.
6 36 41	I. Sh. E.	12 12 32	II. Sh. I.	4 3 23	I. Tr. I.	20 47 17	III.*Tr. I.
7 50 13	I. Tr. E.	14 40 58	II. Sh. E.	4 53 1	I. Sh. E.	22 34 52	III. Tr. E.
		14 48 12	II. Tr. I.	6 12 7	I. Tr. E.		
4 1 34 39	I. Ec. D.	17 15 28	II. Tr. E.	11 17 13	III. Sh. I.	27 1 44 25	I. Ec. D.
4 59 30	I. Oc. R.			13 3 45	III. Sh. E.	5 16 34	I. Oc. R.
9 37 22	II. Sh. I.	18 0 50 12	I. Sh. I.	16 42 5	III. Tr. I.	12 29 56	II. Ec. D.
12 5 50	II. Sh. E.	2 7 20	I. Tr. I.	18 30 16	III.*Tr. E.	15 0 16	II. Ec. R.
12 6 41	II. Tr. I.	2 59 6	I. Sh. E.	23 50 39	I. Ec. D.	15 15 4	II. Oc. D.
14 34 17	II. Tr. E.	4 16 12	I. Tr. E.			17 43 12	II.*Oc. R.
22 56 8	I. Sh. I.	7 17 45	III. Sh. I.	20 3 21 29	I. Oc. R.	23 6 35	I. Sh. I.
		9 3 28	III. Sh. E.	9 54 23	II. Ec. D.		
5 0 10 25	I. Tr. I.	12 33 16	III. Tr. I.	12 24 48	II. Ec. R.	28 0 27 12	I. Tr. I.
1 5 8	I. Sh. E.	14 22 0	III. Tr. E.	12 37 22	II. Oc. D.	1 15 21	I. Sh. E.
2 19 29	I. Tr. E.	21 56 53	I. Ec. D.	15 5 53	II. Oc. R.	2 35 45	I. Tr. E.
3 18 14	III. Sh. I.			21 12 42	I.*Sh. I.	20 12 50	I.*Ec. D.
5 3 8	III. Sh. E.	18 1 25 33	I. Oc. R.	22 32 18	I. Tr. I.	23 45 10	I. Oc. R.
8 21 18	III. Tr. I.	7 18 40	II. Ec. D.	23 21 31	I. Sh. E.		
10 10 31	III. Tr. E.	9 49 10	II. Ec. R.				
20 3 8	I.*Ec. D.	9 57 45	II. Oc. D.	21 0 40 59	I. Tr. E.	29 6 40 42	II. Sh. I.
23 28 50	I. Oc. R.	12 26 40	II. Oc. R.	18 19 4	I.*Ec. D.	9 9 13	II. Sh. E.
		19 18 45	I.*Sh. I.	21 50 19	I.*Oc. R.	9 25 15	II. Tr. I.
6 4 42 45	II. Ec. D.	20 36 27	I.*Tr. I.			11 51 49	II. Tr. E.
7 13 22	II. Ec. R.	21 27 37	I.*Sh. E.			17 35 1	I.*Sh. I.
7 16 18	II. Oc. D.	22 45 18	I. Tr. E.	23 4 5 20	II. Sh. I.	18 55 45	I.*Tr. E.
9 45 38	II. Oc. R.			6 33 47	II. Sh. E.	19 43 46	I.*Sh. E.
17 24 42	I. Sh. I.	14 16 25 18	I. Ec. D.	6 47 37	II. Tr. I.	21 4 16	I.*Tr. E.
18 39 45	I.*Tr. I.	19 54 35	I.*Oc. R.	9 14 25	II. Tr. E.		
19 33 40	I.*Sh. E.			15 41 9	I. Sh. I.	30 5 2 26	III. Ec. D.
20 48 45	I.*Tr. E.	15 1 30 4	II. Sh. I.	17 1 5	I.*Tr. I.	6 53 1	III. Ec. R.
		3 58 29	II. Sh. E.	17 49 57	I.*Sh. E.	10 34 37	III. Oc. D.
7 14 31 33	I. Ec. D.	4 8 19	II. Tr. I.	19 9 43	I.*Tr. E.	12 24 34	III. Oc. R.
17 58 3	I.*Oc. R.	6 35 25	II. Tr. E.			14 41 18	I. Ec. D.
22 54 52	II. Sh. I.	13 47 12	I. Sh. I.	23 1 3 20	III. Ec. D.	18 13 46	I.*Oc. R.
		15 5 28	I. Tr. I.	2 53 1	III. Ec. R.		
8 1 23 18	II. Sh. E.	15 56 4	I. Sh. E.	6 31 35	III. Oc. D.	31 1 47 31	II. Ec. D.
1 27 30	II. Tr. I.	17 14 15	I. Tr. E.	8 22 6	III. Oc. R.	4 17 49	II. Ec. R.
3 54 55	II. Tr. E.	21 3 35	III.*Ec. D.	12 47 31	I. Ec. D.	4 33 3	II. Oc. D.
11 53 11	I. Sh. I.	22 52 23	III. Ec. R.	16 19 8	I. Oc. R.	7 1 1	II. Oc. R.
13 8 58	I. Tr. I.			23 12 3	II. Ec. D.	12 3 32	I. Sh. I.
14 2 7	I. Sh. E.	16 2 24 16	III. Oc. D.			13 24 19	I. Tr. I.
15 17 56	I. Tr. E.	4 15 20	III. Oc. R.	24 1 42 26	II. Ec. R.	14 12 16	I. Sh. E.
17 3 54	III. Ec. D.	10 53 45	I. Ec. D.	1 56 23	II. Oc. D.	15 32 48	I. Tr. E.
18 51 52	III.*Ec. R.	14 23 37	I. Oc. R.	4 24 43	II. Oc. R.		

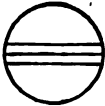

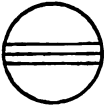
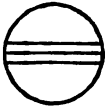
NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

\*Visible at Washington.

GREENWICH MEAN TIME.

AUGUST.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

<p>I.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 10px;"> <sup>*</sup> d         </div>  </div>	<p>III.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 10px;"> <sup>*</sup> d         </div> <div style="text-align: center; margin-right: 10px;"> <sup>*</sup> r         </div>  </div>
<p>II.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 10px;"> <sup>*</sup> d         </div> <div style="text-align: center; margin-right: 10px;"> <sup>*</sup> r         </div>  </div>	<p>IV. No Eclipse.</p> 

*Configurations at 19<sup>h</sup> 30<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	2. 1. ○	4. .3 ●
2	○	.1 .3 4. .2 ●
3	.1 ○	2.4. 3.
4	2. ○ 1. 3.	
5	4. .4. .1 ○	
6	○ 1. 4. 3.	○ .2
7	4. .3 ○	.12.
8	4. 2. 1. .3	○
9	.4 ○	.1 .3 .2 ●
10	.4 .1 ○	2. 3.
11	.4 2. ○	1. 3.
12	.2 .1 ○	
13	3. 1 ○ .4	
14	.3 ○	2. .4 .1 ●
15	2. .1. ○	.4
16	.2 ○	.1 .3 .4
17	1. ○	.2 .3 4.
18	○ 2.	○ 1. 3. 4.
19	.2 .13. ○	4.
20	3. ○	1.2 4.
21	.3 .4. ○	2. .1 ●
22	4. 2.3 1. ○	
23	4. .2 ○	.1 .3
24	4. 1. ○	.2 .3
25	4. 2 ○ .1 3.	
26	.4 .2 .1 3 ○	
27	.4 3. ○	.21.
28	.3 .4 .1 ○	2.
29	○ 1. .32. .4 ○	
30	.2 ○	.1 .3 .4
31	1. ○	.2 .3 .4

## GREENWICH MEAN TIME.

## SEPTEMBER.

d h m s		d h m s		d h m s		d h m s	
1 9 9 42	I. Ec. D.	9 8 25 41	I. Sh. I.	17 7 25 52	I. Ec. D.	25 1 24 2	II. Oc. D.
12 42 14	I. Oc. R.	9 45 53	I. Tr. I.	8 39 52	III. Tr. I.	3 50 47	II. Oc. R.
19 58 36	II.*Sh. I.	10 34 26	I. Sh. E.	10 25 30	III. Tr. E.	6 41 24	I. Sh. I.
22 27 10	II. Sh. E.	11 54 17	I. Tr. E.	10 56 5	I. Oc. R.	7 56 25	I. Tr. I.
22 43 39	II. Tr. I.	23 16 4	III. Sh. I.	20 15 37	II.*Ec. D.	8 50 20	I. Sh. E.
				22 45 42	II. Ec. R.	10 4 48	I. Tr. E.
				22 55 16	II. Oc. D.		
2 1 10 7	II. Tr. E.	10 1 5 26	III. Sh. E.			26 3 48 14	I. Ec. D.
6 31 56	I. Sh. I.	4 46 39	III. Tr. I.			7 14 42	I. Oc. R.
7 52 44	I. Tr. I.	5 32 1	I. Ec. D.	18 1 22 20	II. Oc. R.	17 3 23	II.*Sh. I.
8 40 40	I. Sh. E.	6 32 57	III. Tr. E.	4 47 47	I. Sh. I.	19 32 35	II.*Sh. E.
10 1 12	I. Tr. E.	9 3 56	I. Oc. R.	6 5 47	I. Tr. I.	19 36 30	II.*Tr. I.
19 16 35	III.*Sh. I.	17 40 33	II.*Ec. D.	6 56 37	I. Sh. E.	22 2 30	II.*Tr. E.
21 4 56	III.*Sh. E.	20 10 42	II.*Ec. R.	8 14 8	I. Tr. E.		
		20 24 7	II.*Oc. D.				
		22 51 31	II. Oc. R.				
8 0 49 17	III. Tr. I.			19 1 54 19	I. Ec. D.	27 1 9 47	I. Sh. I.
2 36 14	III. Tr. E.			5 23 55	I. Oc. R.	2 23 52	I. Tr. I.
3 38 12	I. Ec. D.	11 2 54 7	I. Sh. I.	14 27 31	II. Sh. I.	3 18 45	I. Sh. E.
7 10 45	I. Oc. R.	4 14 0	I. Tr. I.	16 56 29	II.*Sh. E.	4 32 15	I. Tr. E.
15 5 18	II. Ec. D.	5 2 53	I. Sh. E.	17 6 53	II.*Tr. I.	21 0 32	III.*Ec. D.
17 35 32	II.*Ec. R.	6 22 24	I. Tr. E.	19 32 57	II.*Tr. E.	22 16 46	I.*Ec. D.
17 50 40	II.*Oc. D.			23 16 10	I. Sh. I.	22 54 57	III. Ec. R.
20 18 26	II.*Oc. R.	12 0 0 27	I. Ec. D.				
		3 32 2	I. Oc. R.	20 0 33 31	I. Tr. I.	28 1 42 15	I. Oc. R.
4 1 0 23	I. Sh. I.	11 51 46	II. Sh. I.	1 25 2	I. Sh. E.	2 6 33	III. Oc. D.
2 21 7	I. Tr. I.	14 20 32	II. Sh. E.	2 41 53	I. Tr. E.	3 53 29	III. Oc. R.
3 9 8	I. Sh. E.	14 35 1	II. Tr. I.	17 0 18	III.*Ec. D.	12 7 57	II. Ec. D.
4 29 35	I. Tr. E.	17 1 12	II.*Tr. E.	18 53 43	III.*Ec. R.	17 4 8	II.*Oc. R.
22 6 37	I.*Ec. D.	21 22 31	I.*Sh. I.	20 22 49	I.*Ec. D.	19 38 13	I.*Sh. I.
		22 42 2	I. Tr. I.	22 19 44	III.*Oc. D.	20 51 19	I.*Tr. I.
		23 31 18	I. Sh. E.	23 51 45	I. Oc. R.	21 47 13	I.*Sh. E.
5 1 39 6	I. Oc. R.					22 59 42	I. Tr. E.
9 16 11	II. Sh. I.						
11 44 48	II. Sh. E.	13 0 50 24	I. Tr. E.	21 0 7 31	III. Oc. R.		
12 1 7	II. Tr. I.	13 0 46	III. Ec. D.	9 33 2	II. Ec. D.	29 16 45 11	I.*Ec. D.
14 27 28	II. Tr. E.	14 53 13	III. Ec. R.	12 3 6	II. Ec. R.	20 9 38	I.*Oc. R.
19 28 48	I.*Sh. I.	18 28 53	III.*Oc. D.	12 9 54	II. Oc. D.		
20 49 25	I.*Tr. I.	18 28 56	I.*Ec. D.	14 36 50	II. Oc. R.	30 6 21 39	II. Sh. I.
21 37 33	I.*Sh. E.	20 17 28	III.*Oc. R.	17 44 37	I.*Sh. I.	8 50 48	II. Tr. I.
22 57 51	I. Tr. E.	22 0 9	I.*Oc. R.	19 1 15	I.*Tr. I.	8 51 0	II. Sh. E.
				19 53 30	I.*Sh. E.	11 16 49	II. Tr. E.
				21 9 37	I.*Tr. E.	14 6 36	I. Sh. I.
6 9 1 27	III. Ec. D.	14 6 58 0	II. Ec. D.			15 18 38	I.*Tr. I.
10 52 58	III. Ec. R.	9 28 9	II. Ec. R.			16 15 38	I.*Sh. E.
14 33 40	III. Oc. D.	9 39 57	II. Oc. D.	22 14 51 14	I. Ec. D.	17 27 2	I.*Tr. E.
16 22 59	III.*Oc. R.	12 7 11	II. Oc. R.	18 19 25	I.*Oc. R.		
16 35 6	I.*Ec. D.	15 50 59	I.*Sh. I.				
20 7 28	I.*Oc. R.	17 10 3	I.*Tr. I.	23 3 45 41	II. Sh. I.		
		17 59 46	I.*Sh. E.	6 14 46	II. Sh. E.		
		19 18 26	I.*Tr. E.	6 22 16	II. Tr. I.		
7 4 22 51	II. Ec. D.			8 48 19	II. Tr. E.		
6 53 3	II. Ec. R.			12 12 59	I. Sh. I.		
7 7 37	II. Oc. D.	15 12 57 20	I. Ec. D.	13 28 51	I. Tr. I.		
9 35 13	II. Oc. R.	16 28 5	I.*Oc. R.	14 21 54	I. Sh. E.		
13 57 18	I. Sh. I.			15 37 13	I.*Tr. E.		
15 17 43	I. Tr. I.	16 1 9 52	II. Sh. I.				
16 6 2	I.*Sh. E.	3 38 44	II. Sh. E.	24 7 15 5	III. Sh. I.		
17 26 8	I.*Tr. E.	3 51 30	II. Tr. I.	9 6 39	III. Sh. E.		
		6 17 38	II. Tr. E.	9 19 47	I. Ec. D.		
8 11 3 30	I. Ec. D.	10 19 21	I. Sh. I.	12 27 57	III. Tr. I.		
14 35 40	I. Oc. R.	11 37 56	I. Tr. I.	12 47 9	I. Oc. R.		
22 34 10	II. Sh. I.	12 28 10	I. Sh. E.	14 12 52	III. Tr. E.		
		13 46 18	I. Tr. E.	22 50 34	II. Ec. D.		
9 1 2 51	II. Sh. E.						
1 18 35	II. Tr. I.	17 3 15 50	III. Sh. I.				
3 44 51	II. Tr. E.	5 6 18	III. Sh. E.	25 1 20 35	II. Ec. R.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

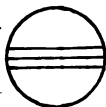
\*Visible at Washington.

## GREENWICH MEAN TIME.

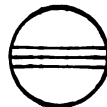
SEPTEMBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.

\*  
d

III.

\*  
d\*  
r

II.

\*  
d\*  
r

IV. No Eclipse.

*Configurations at 19<sup>h</sup> 0<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1		○ 2. 1 3. 4
2	2. 1.	○ 3. 4
3	3.	○ 1. 4. 2 ●
4	3. 1.	○ 2. 4.
5	.3 2.	○ 1. 4.
6	.2	○ 3 4. 1 ●
7	.1	○ .2 .3
8	4.	○ .1 3.
9	4. 2. 1.	○ 3.
10	4. 3.	○ 1. 2 ●
11	.4 3. 1.	○ 2.
12	.4 .3 2.	○ 1.
13	.4 .2	○ 1 ● 3 ●
14	○ 1. .4	○ .2 .3
15		○ .1 2. 3.
16	2. 1.	○ 3. 4
17	3. .2	○ .1 4.
18	3. 1.	○ .2 4.
19	○ 2. .3	○ 1. 4.
20	.2 .1	○ 4.
21		1 ○ .2 .3 4.
22		○ .1 2. 4. 3.
23	2. 1.	○ 4. 3.
24	4. .3	○ .1
25	4. 3. 1.	○ .2
26	4. .3 2.	○ 1.
27	4. .2 .1	○
28	.4	○ .1 .2 .3
29	.4	○ 2. .3 1 ●
30	.4 2. 1.	○ 3.

## GREENWICH MEAN TIME.

## OCTOBER.

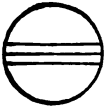
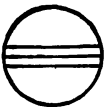

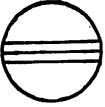
d h m s		d h m s		d h m s		d h m s	
11 13 45	I. Ec. D.	9 11 34 15	I. Tr. I.	18 5 17 58	II. Tr. E.	26 16 22 2	III.*Oc. D.
11 14 6	III. Sh. I.	12 37 49	I. Sh. E.	6 50 34	I. Sh. I.	18 6 12	III.*Oc. R.
13 6 51	III. Sh. E.	13 42 44	I. Tr. E.	7 48 3	I. Tr. I.	22 26 48	II.*Ec. D.
14 37 5	I.*Oc. R.			9 0 2	I. Sh. E.		
16 11 9	III.*Tr. I.	10 7 36 17	I. Ec. D.	9 56 40	I. Tr. E.	27 2 29 51	II. Oc. R.
17 55 19	III.*Tr. E.	10 52 53	I. Oc. R.			3 12 41	I. Sh. I.
		22 15 36	II.*Sh. I.	19 3 59 3	I. Ec. D.	4 0 17	I. Tr. I.
2 1 25 23	II. Ec. D.			7 7 4	I. Oc. R.	5 22 23	I. Sh. E.
6 16 52	II. Oc. R.	11 0 28 58	II. Tr. I.	8 59 10	III. Ec. D.	6 9 2	I. Tr. E.
8 35 0	I. Sh. I.	0 45 22	II. Sh. E.	10 56 49	III. Ec. R.		
9 45 54	I. Tr. I.	2 55 2	II. Tr. E.	12 55 24	III. Oc. D.	28 0 21 51	I. Ec. D.
10 44 4	I. Sh. E.	4 56 57	I. Sh. I.	14 40 9	III.*Oc. R.	3 19 34	I. Oc. R.
11 54 20	I. Tr. E.	6 1 8	I. Tr. I.	19 52 10	II.*Ec. D.	16 47 18	II.*Sh. I.
		7 6 14	I. Sh. E.			18 22 26	II.*Tr. I.
3 5 42 13	I. Ec. D.	8 9 38	I. Tr. E.	20 0 11 45	II. Oc. R.	19 17 54	II.*Sh. E.
9 4 21	I. Oc. R.			1 19 1	I. Sh. I.	20 48 55	II.*Tr. E.
19 39 25	II.*Sh. I.	12 2 4 52	I. Ec. D.	2 14 39	I. Tr. I.	21 41 6	I.*Sh. I.
22 3 54	II.*Tr. I.	4 59 57	III. Ec. D.	3 28 31	I. Sh. E.	22 26 33	I.*Tr. I.
22 8 54	II.*Sh. E.	5 19 54	I. Oc. R.	4 23 17	I. Tr. E.	23 50 51	I. Sh. E.
		6 56 30	III. Ec. R.	22 27 32	I.*Ec. D.		
4 0 29 54	II. Tr. E.	9 24 19	III. Oc. D.			29 0 35 20	I. Tr. E.
3 3 22	I. Sh. I.	11 9 40	III. Oc. R.	21 1 33 38	I. Oc. R.	18 50 31	I.*Ec. D.
4 13 5	I. Tr. I.	17 17 30	II.*Ec. D.	14 10 36	II.*Sh. I.	21 45 58	I.*Oc. R.
5 12 29	I. Sh. E.	21 51 32	II.*Oc. R.	16 2 47	II.*Tr. I.		
6 21 30	I. Tr. E.	23 25 24	I. Sh. I.	16 40 53	II.*Sh. E.	30 3 11 30	III. Sh. I.
				18 29 3	II.*Tr. E.	5 9 12	III. Sh. E.
5 0 10 46	I. Ec. D.	13 0 28 0	I. Tr. I.	19 47 25	I.*Sh. I.	6 17 17	III. Tr. I.
1 0 10	III. Ec. D.	1 34 43	I. Sh. E.	20 41 9	I.*Tr. I.	7 59 18	III. Tr. E.
2 55 38	III. Ec. R.	2 36 31	I. Tr. E.	21 56 58	I.*Sh. E.	11 44 6	II. Ec. D.
3 31 38	I. Oc. R.	20 33 20	I.*Ec. D.	22 49 48	I.*Tr. E.	15 38 10	II.*Oc. R.
5 47 52	III. Oc. D.	23 46 43	I. Oc. R.			16 9 32	I.*Sh. I.
7 33 58	III. Oc. R.			23 16 56 10	I.*Ec. D.	16 52 45	I.*Tr. I.
14 42 45	II.*Ec. D.	14 11 34 5	II. Sh. I.	20 0 16	I.*Oc. R.	18 19 20	I.*Sh. E.
19 29 0	II.*Oc. R.	13 41 2	II.*Tr. I.	23 12 5	III. Sh. I.	19 1 34	I.*Tr. E.
21 31 48	I.*Sh. I.	14 4 2	II.*Sh. E.				
22 40 14	I. Tr. I.	16 7 9	II.*Tr. E.	23 1 8 30	III. Sh. E.	31 13 19 5	I.*Ec. D.
23 40 57	I. Sh. E.	17 53 47	I.*Sh. I.	2 52 38	III. Tr. I.	16 12 13	I.*Oc. R.
		18 54 45	I.*Tr. I.	4 34 54	III. Tr. E.		
6 0 48 40	I. Tr. E.	20 3 9	I.*Sh. E.	9 9 27	II. Ec. D.		
18 39 13	I.*Ec. D.	21 3 18	I.*Tr. E.	13 21 1	II.*Oc. R.		
21 58 44	I.*Oc. R.			14 15 49	I.*Sh. I.		
		15 15 1 56	I.*Ec. D.	15 7 35	I.*Tr. I.		
7 8 57 48	II. Sh. I.	18 13 37	I.*Oc. R.	16 25 26	I.*Sh. E.		
11 17 4	II. Tr. I.	19 12 18	III.*Sh. I.	17 16 16	I.*Tr. E.		
11 27 26	II. Sh. E.	21 7 27	III.*Sh. E.				
13 43 7	II. Tr. E.	23 23 9	III. Tr. I.	24 11 24 43	I. Ec. D.		
16 0 11	I.*Sh. I.			14 26 44	I.*Oc. R.		
17 7 16	I.*Tr. I.	16 1 5 55	III. Tr. E.				
18 9 22	I.*Sh. E.	6 34 49	II. Ec. D.	25 3 28 32	II. Sh. I.		
19 15 44	I.*Tr. E.	11 1 54	II. Oc. R.	5 12 26	II. Tr. I.		
		12 22 11	I. Sh. I.	5 58 58	II. Sh. E.		
8 13 7 48	I. Ec. D.	13 21 27	I. Tr. I.	7 38 47	II. Tr. E.		
15 13 12	III.*Sh. I.	14 31 36	I.*Sh. E.	8 44 13	I. Sh. I.		
16 25 54	I.*Oc. R.	15 30 2	I.*Tr. E.	9 33 56	I. Tr. I.		
17 7 8	III.*Sh. E.			10 53 53	I. Sh. E.		
19 49 37	III.*Tr. I.	17 9 30 27	I. Ec. D.	11 42 40	I. Tr. E.		
21 33 2	III.*Tr. E.	12 40 20	I. Oc. R.				
				26 5 53 20	I. Ec. D.		
9 4 0 8	II. Ec. D.	18 0 51 58	II. Sh. I.	8 53 14	I. Oc. R.		
8 40 32	II. Oc. R.	2 51 47	II. Tr. I.	12 58 26	III.*Ec. D.		
10 28 35	I. Sh. I.	3 22 4	II. Sh. E.	14 57 11	III.*Ec. R.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. \* Visible at Washington.

## GREENWICH MEAN TIME.

OCTOBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

I.		III.	
II.		IV. No Eclipse.	

*Configurations at 18<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1		<sup>3</sup> ○ <sup>1</sup>
2	3 <sup>•</sup> 1 <sup>•</sup>	○ <sup>4</sup> <sup>2</sup>
3	• 3	○ 2 <sup>•</sup> <sup>1</sup> <sup>4</sup>
4	2 <sup>•</sup> <sup>3</sup> <sup>1</sup>	○ <sup>4</sup>
5		○ 1 <sup>•</sup> <sup>3</sup> <sup>4</sup> <sup>2</sup> ●
6		<sup>1</sup> ○ 2 <sup>•</sup> <sup>3</sup> <sup>4</sup>
7	○ 1 <sup>•</sup>	2 <sup>•</sup> ○ 3 <sup>•</sup> <sup>4</sup>
8		<sup>2</sup> 3 ○ <sup>1</sup> <sup>4</sup>
9	3 <sup>•</sup> 1 <sup>•</sup>	○ <sup>2</sup> <sup>4</sup>
10	• 3	<sup>4</sup> ○ <sup>3</sup> <sup>1</sup>
11	<sup>4</sup> <sup>3</sup> <sup>1</sup>	○ <sup>1</sup> <sup>2</sup>
12	4 <sup>•</sup>	○ <sup>1</sup> <sup>2</sup> <sup>3</sup> <sup>4</sup> ●
13	4 <sup>•</sup>	<sup>1</sup> ○ 2 <sup>•</sup> <sup>3</sup>
14	4 <sup>•</sup>	2 <sup>1</sup> ○ <sup>3</sup>
15	• 4	<sup>2</sup> ○ <sup>3</sup> <sup>1</sup>
16	• 4 3 <sup>•</sup> 1 <sup>•</sup>	○ <sup>2</sup>
17	3 <sup>•</sup> <sup>4</sup>	○ <sup>1</sup> <sup>2</sup>
18	<sup>3</sup> 1 <sup>•</sup> <sup>4</sup>	○
19		<sup>2</sup> ○ <sup>3</sup> <sup>1</sup> <sup>4</sup>
20		<sup>1</sup> ○ <sup>2</sup> <sup>3</sup> <sup>4</sup>
21	○ 2 <sup>•</sup>	○ 1 <sup>•</sup> 3 <sup>•</sup> <sup>4</sup>
22		<sup>2</sup> ○ <sup>3</sup> <sup>4</sup> <sup>1</sup> ●
23		3 <sup>•</sup> 1 <sup>•</sup> ○ <sup>2</sup> <sup>4</sup>
24	3 <sup>•</sup>	○ <sup>1</sup> <sup>2</sup> <sup>4</sup>
25	• 3 2 <sup>1</sup>	○ <sup>4</sup>
26		<sup>2</sup> ○ <sup>1</sup> <sup>3</sup>
27		<sup>4</sup> ○ <sup>2</sup> <sup>3</sup>
28	4 <sup>•</sup>	○ 1 <sup>•</sup> 3 <sup>•</sup>
29	4 <sup>•</sup> <sup>2</sup>	○ 1 <sup>•</sup> <sup>3</sup>
30	○ 1 <sup>•</sup> 4 <sup>•</sup> 3 <sup>•</sup>	○ <sup>2</sup>
31	• 4 3 <sup>•</sup>	○ <sup>1</sup> <sup>2</sup>



## GREENWICH MEAN TIME.

## NOVEMBER.

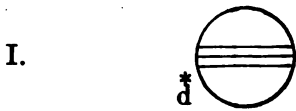
d h m s		d h m s		d h m s		d h m s	
1 6 519	II. Sh. I.	9 2058 7	III.*Ec. D.	18 832 57	I. Oc. R.	27 19 948	III.*Sh. I.
731 8	II. Tr. I.	2259 7	III.*Ec. R.			19 24 42	III.*Tr. I.
836 4	II. Sh. E.	23 427	III.*Oc. D.	19 038 48	II. Sh. I.	21 9 17	III.*Tr. E.
957 44	II. Tr. E.			11152	II. Tr. I.	21 12 36	III.*Sh. E.
1037 57	I. Sh. I.	10 048 28	III. Oc. R.	310 11	II. Sh. E.	22 2 53	II.*Ec. D.
1118 54	I. Tr. I.	336 3	II. Ec. D.	322 49	I. Sh. I.	23 45 34	I. Sh. I.
1247 48	I.*Sh. E.	7 0 18	I. Sh. I.	338 19	I. Tr. I.	23 47 14	I. Tr. I.
1327 45	I.*Tr. E.	7 0 48	II. Oc. R.	339 19	II. Tr. E.		
		729 2	I. Tr. I.	533 2	I. Sh. E.	28 033 41	II. Oc. R.
2 747 45	I. Ec. D.	910 21	I. Sh. E.	547 27	I. Tr. E.	155 54	I. Sh. E.
1038 31	I. Oc. R.	938 2	I. Tr. E.			156 29	I. Tr. E.
1658 7	III.*Ec. D.			20 034 19	I. Ec. D.	20 57 53	I.*Ec. D.
1858 0	III.*Ec. R.	11 410 52	I. Ec. D.	258 56	I. Oc. R.	23 9 18	I.*Ec. R.
1944 56	III.*Oc. D.	649 2	I. Oc. R.	1510 9	III.*Sh. I.		
2128 51	III.*Oc. R.	22 124	II.*Sh. I.	1610 51	III.*Tr. I.	29 16 33 24	II.*Tr. I.
		22 56 38	II.*Tr. I.	1711 44	III.*Sh. E.	1634 54	II.*Sh. I.
3 1 126	II. Ec. D.			1754 12	III.*Tr. E.	1813 0	I.*Tr. I.
446 6	II. Oc. R.	12 032 34	II. Sh. E.	1928 6	II.*Ec. D.	1814 8	I.*Sh. I.
5 626	I. Sh. I.	123 42	II. Tr. E.	2151 21	I.*Sh. I.	19 127	II.*Tr. E.
545 2	I. Tr. I.	128 47	I. Sh. I.	22 4 6	I.*Tr. I.	19 632	II.*Sh. E.
716 19	I. Sh. E.	154 57	I. Tr. I.	2220 53	II.*Oc. R.	20 22 17	I.*Tr. E.
753 54	I. Tr. E.	338 52	I. Sh. E.			20 24 29	I.*Sh. E.
		4 359	I. Tr. E.	21 0 136	I. Sh. E.		
4 216 18	I. Ec. D.	2239 35	I.*Ec. D.	013 16	I. Tr. E.	30 15 24 4	I.*Oc. D.
5 439	I. Oc. R.			19 259	I.*Ec. D.	1738 8	I.*Ec. R.
1924 14	II.*Sh. I.	13 115 7	I. Oc. R.	2124 49	I.*Oc. R.		
2040 17	II.*Tr. I.	1110 44	III. Sh. I.				
2155 8	II.*Sh. E.	1255 49	III.*Tr. I.	22 13 57 9	II.*Sh. I.		
23 7 2	II.*Tr. E.	1311 3	III.*Sh. E.	1418 49	II.*Tr. I.		
2334 53	I. Sh. I.	1438 21	III.*Tr. E.	1619 52	I.*Sh. I.		
		1653 24	II.*Ec. D.	1628 39	II.*Sh. E.		
5 011 6	I. Tr. I.	1957 17	I.*Sh. I.	1629 52	I.*Tr. I.		
144 49	I. Sh. E.	20 741	II.*Oc. R.	1646 27	II.*Tr. E.		
220 1	I. Tr. E.	2020 49	I.*Tr. I.	1830 8	I.*Sh. E.		
2044 59	I.*Ec. D.	22 724	I.*Sh. E.	1839 4	I.*Tr. E.		
2330 52	I. Oc. R.	2229 53	I.*Tr. E.				
				23 13 31 45	I.*Ec. D.		
6 711 18	III. Sh. I.	1417 813	I.*Ec. D.	1550 47	I.*Oc. R.		
910 20	III. Sh. E.	1941 3	I.*Oc. R.				
938 22	III. Tr. I.			24 459 9	III. Ec. D.		
1120 28	III. Tr. E.	15 1119 38	II.*Sh. I.	722 24	III. Oc. R.		
1418 44	II.*Ec. D.	12 354	II.*Tr. I.	845 30	II. Ec. D.		
1753 36	II.*Oc. R.	1350 55	II.*Sh. E.	1048 27	I.*Sh. I.		
18 321	I.*Sh. I.	1425 46	I.*Sh. I.	1055 40	I.*Tr. I.		
1837 6	I.*Tr. I.	1431 9	II.*Tr. E.	1127 18	II.*Oc. R.		
2013 19	I.*Sh. E.	1446 39	I.*Tr. I.	1258 44	I.*Sh. E.		
2046 3	I.*Tr. E.	1635 54	I.*Sh. E.	13 453	I.*Tr. E.		
		1655 44	I.*Tr. E.				
71513 35	I.*Ec. D.			25 8 024	I. Ec. D.		
1756 56	I.*Oc. R.	161136 57	I.*Ec. D.	1016 38	I. Oc. R.		
		14 7 4	I.*Oc. R.				
8 842 22	II. Sh. I.			26 316 29	II. Sh. I.		
948 11	II. Tr. I.	17 058 54	III. Ec. D.	326 34	II. Tr. I.		
1113 24	II. Sh. E.	4 625	III. Oc. R.	517 1	I. Sh. I.		
1215 5	II.*Tr. E.	610 46	II. Ec. D.	521 28	I. Tr. I.		
1231 48	I.*Sh. I.	854 18	I. Sh. I.	548 2	II. Sh. E.		
13 3 4	I.*Tr. I.	912 30	I. Tr. I.	554 26	II. Tr. E.		
1441 48	I.*Sh. E.	914 24	II. Oc. R.	727 19	I. Sh. E.		
1512 2	I.*Tr. E.	11 429	I. Sh. E.	730 41	I. Tr. E.		
		1121 37	I.*Tr. E.				
9 942 17	I. Ec. D.			27 229 12	I. Ec. D.		
1223 4	I.*Oc. R.	18 6 534	I. Ec. D.	442 37	I. Oc. R.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

\*Visible at Washington.

## GREENWICH MEAN TIME.

NOVEMBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.**Configurations at 17<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.*

Day.	West.					East.				
1		•4	•3	• <sup>3</sup> 1.	○					
2			•4	•2	○	•1				•3 ●
3				•4 1.	○	•2 •3				
4					○	2 •1	3.			
5			2.	•1	○	3 •4				
6				3 •1	○		•4			•2 ●
7			3.		○	2.		•4		•1 ●
8			•3	2 •1	○		•4			
9				•2 •3	○	•1		4.		
10				1.	○	•2 •3	4.			
11					○	• <sup>3</sup> 1.	4 •3			
12				2.	•1	○	4.	3.		
13				4.	3 •1	○				•2 ●
14			4 •3		○	2.				•1 ●
15		4.	•3	2 •1	○					
16		4.		•2 •3	○	•1				
17		•4		1.	○		• <sup>3</sup> 3			
18		•4			○	• <sup>3</sup> 1	•3			
19			•4	2 •1	○		3.			
20	○ 3.			•4 •2	○	1.				
21			3.	•1	○	•4	•2			
22	○ 1.		•3	2 •1	○		•4			
23				•2 •3	○	•1		•4		
24				1.	○	• <sup>3</sup> 3		•4		
25					○	• <sup>3</sup> 1	•3	4.		
26				2 •1	○		3.	4.		
27				•23	○	1.		4.		
28			3.	•1	○		• <sup>4</sup> 2			
29	○ 2.		•3		1 ○					
30				4 • <sup>2</sup> 3	○					•1 ●

## GREENWICH MEAN TIME.

## DECEMBER.

d h m s		d h m s		d h m s		d h m s	
1 851 10	III. Oc. D.	10 832 24	II. Sh. I.	19 510 24	III. Tr. I.	28 1 959	I. Tr. I.
11 4 9	III.*Ec. R.	848 10	I. Tr. I.	529 2	I. Sh. I.	139 34	II. Tr. I.
11 13 14	II.*Oc. D.	9 548	I. Sh. I.	7 1 5	III. Tr. E.	152 27	I. Sh. I.
12 38 49	I.*Tr. I.	10 25 9	II.*Tr. E.	7 7 49	I. Tr. E.	3 7 33	II. Sh. I.
12 42 45	I.*Sh. I.	10 57 32	I.*Tr. E.	7 10 15	III. Sh. I.	3 19 24	I. Tr. E.
13 50 26	II.*Ec. R.	11 4 6	II.*Sh. E.	7 39 21	I. Sh. E.	4 2 40	I. Sh. E.
14 48 7	I.*Tr. E.	11 16 10	I.*Sh. E.	8 18 10	II. Ec. R.	4 9 25	II. Tr. E.
14 53 5	I.*Sh. E.			9 16 32	III. Sh. E.	5 39 10	II. Sh. E.
		11 559 55	I. Oc. D.			22 23 1	I. Oc. D.
2 949 55	I. Oc. D.	830 53	I. Ec. R.	20 210 44	I. Oc. D.		
12 650	I.*Ec. R.			455 1	I. Ec. R.	29 119 26	I. Ec. R.
		12 153 35	III. Tr. I.	23 20 50	II. Tr. I.	19 36 31	I.*Tr. I.
3 541 13	II. Tr. I.	232 35	II. Oc. D.	23 24 35	I. Tr. I.	20 11 1	II.*Oc. D.
5 54 21	II. Sh. I.	310 5	III. Sh. I.	23 57 42	I. Sh. I.	20 21 10	I.*Tr. I.
7 439	I. Tr. I.	314 7	I. Tr. I.			21 45 56	I. Tr. E.
7 11 21	I. Sh. I.	334 26	I. Sh. I.	21 029 11	II. Sh. I.	22 11 6	III. Oc. D.
8 930	II. Tr. E.	341 53	III. Tr. E.	134 0	I. Tr. E.	22 31 22	I. Sh. E.
8 26 0	II. Sh. E.	515 14	III. Sh. E.	150 15	II. Tr. E.	23 57 41	III. Oc. R.
9 13 57	I. Tr. E.	523 29	I. Tr. E.	2 7 59	I. Sh. E.		
9 21 42	I. Sh. E.	542 57	II. Ec. R.	3 0 52	II. Sh. E.	30 011 11	II. Ec. R.
		544 47	I. Sh. E.	2037 8	I.*Oc. D.	1 0 48	III. Ec. D.
4 415 56	I. Oc. D.			23 23 57	I. Ec. R.	3 10 21	III. Ec. R.
6 35 41	I. Ec. R.	13 025 58	I. Oc. D.			16 49 35	I.*Oc. D.
22 38 21	III.*Tr. I.	259 40	I. Ec. R.	22 17 50 52	I.*Tr. I.	19 48 16	I.*Ec. R.
23 933	III.*Sh. I.	21 353	II.*Tr. I.	17 54 24	II.*Oc. D.		
		21 40 6	I.*Tr. I.	18 26 23	I.*Sh. I.	31 14 3 7	I.*Tr. I.
5 019 30	II. Oc. D.	21 50 57	II.*Sh. I.	18 39 15	III.*Oc. D.	14 49 53	I.*Sh. I.
024 36	III. Tr. E.	22 3 4	I.*Sh. I.	20 0 16	I.*Tr. E.	14 50 9	II.*Tr. I.
113 32	III. Sh. E.	23 32 51	II. Tr. E.	20 32 59	III.*Oc. R.	16 12 31	I.*Tr. E.
130 28	I. Tr. I.	23 49 29	I. Tr. E.	20 36 40	I.*Sh. E.	16 27 15	II.*Sh. I.
139 56	I. Sh. I.			21 0 3	II.*Ec. D.	17 0 4	I.*Sh. E.
3 7 54	II. Ec. R.	14 013 24	I. Sh. E.	21 35 48	II.*Ec. R.	17 20 13	II.*Tr. E.
339 48	I. Tr. E.	022 41	II. Sh. E.	23 8 18	III. Ec. R.	18 58 46	II.*Sh. E.
350 18	I. Sh. E.	18 52 9	I.*Oc. D.				
22 41 49	I.*Oc. D.	21 28 33	I.*Ec. R.	23 15 3 26	I.*Oc. D.		
				17 52 44	I.*Ec. R.		
6 1 4 25	I. Ec. R.	15 15 20 51	III.*Oc. D.				
18 48 14	II.*Tr. I.	15 39 31	II.*Oc. D.	24 12 17 12	I.*Tr. I.		
19 12 51	II.*Sh. I.	16 6 10	I.*Tr. I.	12 30 26	II.*Tr. I.		
19 56 19	I.*Tr. I.	16 31 43	I.*Sh. I.	12 55 5	I.*Sh. I.		
20 832	I.*Sh. I.	18 15 33	I.*Tr. E.	13 48 52	II.*Sh. I.		
21 16 44	II.*Tr. E.	18 42 3	I.*Sh. E.	14 26 36	I.*Tr. E.		
21 44 33	II.*Sh. E.	19 032	II.*Ec. R.	15 0 4	II.*Tr. E.		
22 5 40	I.*Tr. E.	19 635	III.*Ec. R.	15 5 20	I.*Sh. E.		
22 18 54	I.*Sh. E.			16 20 29	II.*Sh. E.		
		16 13 18 15	I.*Oc. D.				
7 17 7 53	I.*Oc. D.	15 57 19	I.*Ec. R.	25 929 55	I. Oc. D.		
19 33 16	I.*Ec. R.			12 21 40	I.*Ec. R.		
		17 10 12 39	II. Tr. I.				
8 12 5 17	III.*Oc. D.	10 32 17	I.*Tr. I.	26 643 34	I. Tr. I.		
13 25 57	II.*Oc. D.	11 0 23	I.*Sh. I.	7 2 28	II. Oc. D.		
14 22 14	I.*Tr. I.	11 10 34	II.*Sh. I.	7 23 45	I. Sh. I.		
14 37 10	I.*Sh. I.	12 41 40	I.*Tr. E.	8 30 37	III. Tr. I.		
15 5 19	III.*Ec. R.	12 41 51	II.*Tr. E.	8 52 59	I. Tr. E.		
16 25 25	II.*Ec. R.	13 10 42	I.*Sh. E.	9 34 0	I. Sh. E.		
16 31 34	I.*Tr. E.	13 42 15	II.*Sh. E.	10 23 52	III.*Tr. E.		
16 47 32	I.*Sh. E.			10 53 29	II.*Ec. R.		
		18 7 44 31	I. Oc. D.	11 10 49	III.*Sh. I.		
9 11 33 49	I.*Oc. D.	10 26 13	I.*Ec. R.	13 18 14	III.*Sh. E.		
14 2 1	I.*Ec. R.						
10 7 56 25	II. Tr. I.	19 446 46	II. Oc. D.	27 356 23	I. Oc. D.		
		458 24	I. Tr. I.	650 29	I. Ec. R.		

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

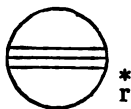
\*Visible at Washington.

## GREENWICH MEAN TIME.

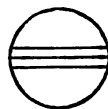
DECEMBER.

*Phases of the Eclipses of the Satellites for an Inverting Telescope.*

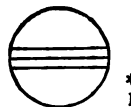
I.



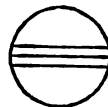
III.



II.



IV. No Eclipse.



*Configurations at 16<sup>h</sup> 15<sup>m</sup> for an Inverting Telescope.*

Day.	West.	East.
1	4.	1. O 3.
2	4.	O .1 2. .3
3	4.	1. O 3.
4	.4	.2 O 3.1.
5	.4 3.	.1 O .2
6	3. .4	O 2.1.
7	3.	.4 O 1.
8	O 1.	O .3 .4 .2 ●
9		O .1 2. .3 .4
10		1. O 3. .4
11		.2 O 1. .4
12		3.1 O .2 4.
13	3.	O 1. 4.
14	.32. .1	O 4.
15	O 1.	O 4. .2 ● .3 ●
16		4. O .1 2. .3
17	4.	1. O 3.
18	4.	.2 O 1. 3.
19	4.	1. O .2
20	.4 3.	O 1. 1.
21	.4 .3 2.	.1 O
22	.4	1. O 1.
23		.4 O 1. 3.
24		1. O 4. 3.
25		.2 O .1 3. .4
26		1.3. O .2 .4
27	3.	O 1. 1. 4.
28	.3 2. .1	O .4
29		1. O 1. 4.
30		.O 1. 1. 3. 4.
31	O 2.	O 4. .3

# 658 MAGNITUDE AND RINGS OF SATURN, 1917.

ELEMENTS FOR DETERMINING THE GEOCENTRIC POSITION, APPEARANCE,  
AND MAGNITUDE OF SATURN'S RINGS.

Greenwich Mean Midnight.		<i>a</i>	<i>b</i>	<i>P</i>	<i>B</i>	<i>U</i>	<i>ω</i>	<i>B'</i>	<i>U'</i>	Stellar Mag.
		"	"	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	
Jan.	1	46.23	-16.78	-7 18.6	-21 17.2	356 5.0	42 23.4	-21 51.6	311 47.9	0.0
	9	46.40	17.03	7 18.6	21 30.1	355 26.8	42 23.3	21 46.8	312 6.3	-0.1
	17	46.46	17.23	7 18.7	21 43.6	354 47.0	42 23.3	21 41.9	312 24.7	0.1
	25	46.39	17.35	7 18.5	21 56.8	354 7.0	42 23.2	21 37.0	312 43.1	0.1
Feb.	2	46.22	17.43	7 18.4	22 9.4	353 28.4	42 23.2	21 32.0	313 1.5	-0.1
	10	45.92	-17.46	-7 18.2	-22 20.8	352 52.9	42 23.2	-21 27.0	313 19.9	0.0
	18	45.55	17.44	7 17.9	22 31.0	352 21.2	42 23.1	21 22.0	313 38.2	0.0
	26	45.08	17.36	7 17.7	22 39.4	351 54.8	42 23.1	21 16.9	313 56.5	+0.1
Mar.	6	44.56	17.24	7 17.6	22 45.8	351 34.6	42 23.0	21 11.8	314 14.8	0.1
	14	43.98	17.07	7 17.5	22 50.3	351 21.2	42 23.0	21 6.6	314 33.0	0.2
	22	43.38	-16.86	-7 17.5	-22 52.7	351 14.8	42 23.0	-21 1.4	314 51.2	+0.2
	30	42.74	16.62	7 17.5	22 52.8	351 15.7	42 22.9	20 56.3	315 9.4	0.3
Apr.	7	42.12	16.36	7 17.6	22 51.1	351 24.0	42 22.9	20 51.1	315 27.6	0.3
	15	41.49	16.07	7 17.8	22 47.0	351 39.5	42 22.9	20 45.8	315 45.7	0.3
	23	40.90	15.77	7 18.0	22 41.0	352 1.7	42 22.8	20 40.6	316 3.8	0.4
May	1	40.33	-15.47	-7 18.2	-22 33.4	352 30.4	42 22.8	-20 35.3	316 21.8	+0.4
	9	39.80	15.16	7 18.5	22 23.6	353 4.9	42 22.7	20 30.1	316 39.9	0.4
	17	39.30	14.85	7 18.7	22 12.1	353 44.6	42 22.7	20 24.7	316 57.9	0.5
	25	38.85	14.54	7 19.0	21 58.9	354 29.1	42 22.7	20 19.3	317 15.8	0.5
June	2	38.45	14.24	7 19.1	21 44.4	355 18.0	42 22.6	20 13.9	317 33.8	0.5
	10	38.10	-13.94	-7 19.1	-21 28.3	356 10.3	42 22.6	-20 8.5	317 51.8	+0.5
	18	37.80	13.66	7 19.0	21 10.9	357 5.5	42 22.6	20 2.9	318 9.7	0.5
	26	37.56	13.38	7 18.7	20 52.3	358 3.2	42 22.5	19 57.4	318 27.6	0.5
July	4	37.37	13.11	7 18.3	20 32.8	359 2.6	42 22.5	19 51.8	318 45.5	0.5
	12	37.24	12.86	7 17.7	20 12.6	0 3.3	42 22.5	19 46.3	319 3.4	0.4
	20	37.16	-12.62	-7 17.0	-19 51.5	1 4.8	42 22.4	-19 40.7	319 21.2	+0.4
	28	37.14	12.40	7 16.1	19 29.9	2 6.5	42 22.4	19 35.0	319 38.9	0.4
Aug.	5	37.17	12.19	7 15.2	19 8.3	3 7.9	42 22.3	19 29.4	319 56.7	0.5
	13	37.26	12.00	7 14.1	18 46.6	4 8.3	42 22.3	19 23.7	320 14.5	0.5
	21	37.41	11.82	7 12.8	18 25.0	5 7.4	42 22.3	19 18.0	320 32.2	0.5
	29	37.61	-11.66	-7 11.5	-18 3.6	6 4.7	42 22.2	-19 12.2	320 49.9	+0.6
Sept.	6	37.87	11.52	7 10.1	17 43.0	6 59.4	42 22.2	19 6.5	321 7.6	0.6
	14	38.19	11.41	7 8.6	17 23.4	7 51.2	42 22.2	19 0.7	321 25.2	0.6
	22	38.56	11.32	7 7.3	17 4.7	8 39.8	42 22.1	18 54.8	321 42.8	0.6
	30	38.97	11.26	7 5.9	16 47.9	9 24.2	42 22.1	18 49.0	322 0.5	0.6
Oct.	8	39.44	-11.22	-7 4.7	-16 32.5	10 4.3	42 22.0	-18 43.1	322 18.1	+0.6
	16	39.94	11.22	7 3.5	16 19.1	10 39.2	42 22.0	18 37.3	322 35.6	0.6
	24	40.49	11.25	7 2.5	16 7.9	11 8.8	42 22.0	18 31.3	322 53.2	0.6
Nov.	1	41.06	11.31	7 1.7	15 59.3	11 32.5	42 21.9	18 25.4	323 10.7	0.6
	9	41.67	11.41	7 1.1	15 53.3	11 49.9	42 21.9	18 19.5	323 28.1	0.5
	17	42.28	-11.54	-7 0.7	-15 50.0	12 0.8	42 21.9	-18 13.6	323 45.6	+0.5
	25	42.91	11.70	7 0.6	15 49.9	12 4.9	42 21.8	18 7.6	324 3.0	0.5
Dec.	3	43.51	11.90	7 0.7	15 52.4	12 2.0	42 21.8	18 1.6	324 20.4	0.4
	11	44.09	12.13	7 1.1	15 58.0	11 52.5	42 21.7	17 55.5	324 37.7	0.4
	19	44.62	12.38	7 1.9	16 6.2	11 36.6	42 21.7	17 49.4	324 55.1	0.3
	27	45.10	-12.64	-7 2.8	-16 17.0	11 14.6	42 21.7	-17 43.4	325 12.4	+0.3

The factor to be multiplied by *a* and *b* to obtain the axes of—

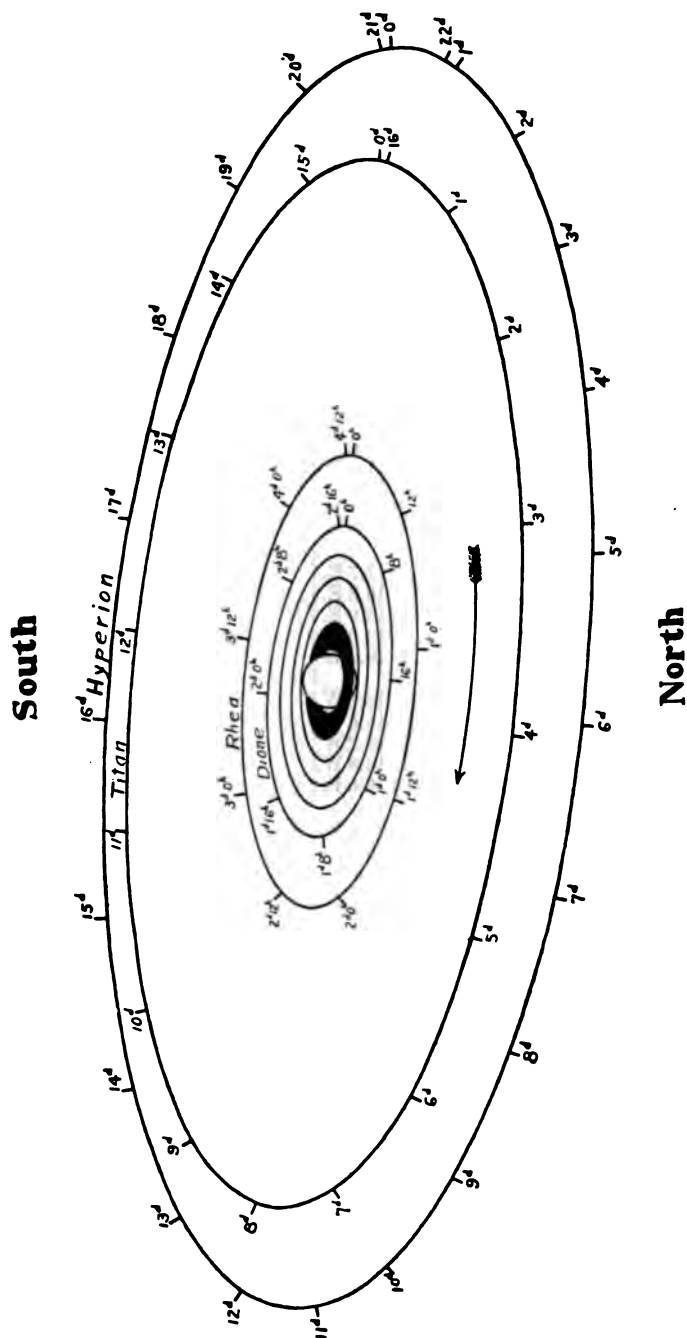
The inner ellipse of the outer ring=0.8801, log factor=9.9445

The outer ellipse of the inner ring=0.8599, log factor=9.9344

The inner ellipse of the inner ring=0.6650, log factor=9.8228

The inner ellipse of the dusky ring=0.5486, log factor=9.7392

NOTE.—The negative sign of *B* indicates that the visible surface of the rings is the southern one.



NAMES OF THE SATELLITES.

- I. Mimas.
- II. Enceladus.
- III. Tethys.
- IV. Dione.
- V. Rhea.
- VI. Titan.
- VII. Hyperion.
- VIII. Iapetus.
- IX. Phoebe.

APPARENT ORBITS OF THE SEVEN INNER SATELLITES OF SATURN,  
AT DATE OF OPPOSITION, JANUARY 17, 1917,  
AS SEEN IN AN INVERTING TELESCOPE.

	d	h
I.	0	22.8
II.	1	8.9
III.	1	21.3
IV.	2	17.7
V.	4	12.5
VI.	15	23.3
VII.	21	7.6
VIII.	79	22.1
IX.	623	15.6

## GREENWICH MEAN TIME.

In the diagram on the preceding page, the points of the orbits marked "0" are those of the eastern elongation, as seen in an inverting telescope. The times of these elongations may be found from the following tables, and the apparent position of a satellite at any other time may be marked on the diagram by setting off on the proper orbit the elapsed interval in days and hours since the last eastern elongation. The orbits of the five inner satellites are regarded as circular, and the time of any greatest elongation not given in the tables may be readily found from those given by adding or subtracting the proper multiple of the mean synodic period. For Titan, Hyperion, and Iapetus the eccentricity is taken into account, and for Iapetus the times both of the greatest elongations and of the conjunctions are given. The following abbreviations are used in the tables:

E., Eastern Elongation.

I., Inferior Conjunction (north of planet).

W., Western Elongation.

S., Superior Conjunction (south of planet).

## MIMAS.

*Greatest Elongations Visible in the United States.*

Jan.	d h	Jan.	d h	Feb.	d h	Apr.	d h	Oct.	d h	Nov.	d h
	1 19.0 E.		29 14.0 W.		25 21.9 W.		3 16.0 W.		12 23.4 W.		27 16.4 E.
	2 17.6 E.		30 1.4 E.		26 20.5 W.		4 14.6 W.		13 22.0 W.		30 0.9 W.
	3 16.2 E.		30 12.7 W.		27 19.1 W.		5 13.3 W.		14 20.6 W.		30 23.5 W.
	4 14.8 E.		31 0.0 E.		28 17.7 W.		8 20.4 E.		15 19.3 W.	Dec.	1 22.2 W.
	5 2.1 W.		31 11.3 W.	Mar.	1 16.4 W.		9 19.0 E.		20 1.1 E.		2 20.8 W.
	5 13.4 E.		31 22.6 E.		2 15.0 W.		10 17.7 E.		20 23.7 E.		3 19.4 W.
	6 0.8 W.	Feb.	1 21.2 E.		3 13.6 W.		11 16.3 E.		21 22.3 E.		4 18.0 W.
	6 12.1 E.		2 19.8 E.		4 12.2 W.		12 14.9 E.		22 20.9 E.		5 16.6 W.
	6 23.4 W.		3 18.4 E.		5 22.2 E.		13 13.5 E.		23 19.5 E.		6 15.2 W.
	7 22.0 W.		4 17.0 E.		6 20.8 E.		17 19.3 W.		24 18.1 E.		8 1.2 E.
	8 20.6 W.		5 15.6 E.		7 19.4 E.		18 18.0 W.		28 1.3 W.		8 23.8 E.
	9 19.2 W.		6 14.2 E.		8 18.0 E.		19 16.6 W.		28 23.9 W.		9 22.4 E.
	10 17.8 W.		7 12.9 E.		9 16.7 E.		20 15.2 W.		29 22.5 W.		10 21.0 E.
	11 16.4 W.		8 0.2 W.		10 15.3 E.		21 13.8 W.		30 21.2 W.		11 19.6 E.
	12 15.0 W.		8 11.5 E.		11 13.9 E.		25 19.6 E.		31 19.8 W.		12 18.3 E.
	13 13.6 W.		8 22.8 W.		12 12.5 E.		26 18.3 E.	Nov.	1 18.4 W.		13 16.9 E.
	14 1.0 E.		9 21.4 W.		13 22.4 W.		27 16.9 E.		6 0.2 E.		14 15.5 E.
	14 12.3 W.		10 20.0 W.		14 21.0 W.		28 15.5 E.		6 22.8 E.		16 1.4 W.
	14 23.6 E.		11 18.6 W.		15 19.7 W.		29 14.1 E.		7 21.4 E.		17 0.0 W.
	15 22.2 E.		12 17.2 W.		16 18.3 W.	May	4 18.6 W.		8 20.0 E.		17 22.7 W.
	16 20.8 E.		13 15.8 W.		17 16.9 W.		5 17.2 W.		9 18.6 E.		18 21.3 W.
	17 19.4 E.		14 14.4 W.		18 15.5 W.		6 15.8 W.		10 17.3 E.		19 19.9 W.
	18 18.0 E.		15 13.1 W.		19 14.1 W.		7 14.4 W.		13 1.8 W.		20 18.5 W.
	19 16.6 E.		16 0.4 E.		20 12.8 W.		8 13.1 W.		14 0.4 W.		21 17.1 W.
	20 15.2 E.		16 11.7 W.		22 21.3 E.		13 17.5 E.		14 23.0 W.		22 15.7 W.
	21 13.8 E.		16 23.0 E.		23 19.9 E.		14 16.1 E.		15 21.7 W.		23 14.3 W.
	22 1.2 W.		17 21.6 E.		24 18.5 E.		15 14.7 E.		16 20.3 W.		24 1.6 E.
	22 12.5 E.		18 20.2 E.		25 17.2 E.		16 13.4 E.		17 18.9 W.		25 0.2 E.
	22 23.8 W.		19 18.8 E.		26 15.8 E.		.....		18 17.5 W.		25 22.8 E.
	23 22.4 W.		20 17.4 E.		27 14.4 E.		.....		22 0.7 E.		26 21.4 E.
	24 21.0 W.		21 16.1 E.		28 13.0 E.	Oct.	4 0.5 E.		22 23.3 E.		27 20.0 E.
	25 19.6 W.		22 14.7 E.		30 21.5 W.		4 23.1 E.		23 21.9 E.		28 18.6 E.
	26 18.2 W.		23 13.3 E.		31 20.2 W.		5 21.7 E.		24 20.5 E.		29 17.3 E.
	27 16.8 W.		24 11.9 E.	Apr.	1 18.8 W.		6 20.3 E.		25 19.1 E.		30 15.9 E.
	28 15.4 W.		24 23.3 W.		2 17.4 W.		12 0.8 W.		26 17.8 E.		31 14.5 E.

## GREENWICH MEAN TIME.

## ENCELADUS.

Jan.	d h	Feb.	d h	Mar.	d h	May	d h	Oct.	d h	Nov.	d h
	2 7.9 E.	11 1.5 E.		22 19.0 E.		1 13.0 E.		18 12.4 E.		27 6.1 E.	
	3 16.8 E.	12 10.4 E.		24 3.9 E.		2 21.8 E.		19 21.3 E.		28 15.0 E.	
	5 1.7 E.	13 19.3 E.		25 12.8 E.		4 6.7 E.		21 6.2 E.		29 23.9 E.	
	6 10.6 E.	15 4.1 E.		26 21.7 E.		5 15.6 E.		22 15.1 E.		Dec. 1 8.7 E.	
	7 19.4 E.	16 13.0 E.		28 6.6 E.		7 0.5 E.		24 0.0 E.		2 17.6 E.	
	9 4.3 E.	17 21.8 E.		29 15.5 E.		8 9.4 E.		25 8.9 E.		4 2.5 E.	
	10 13.2 E.	19 6.7 E.		31 0.4 E.		9 18.3 E.		26 17.7 E.		5 11.4 E.	
	11 22.1 E.	20 15.6 E.	Apr.	1 9.2 E.		11 3.2 E.		28 2.6 E.		6 20.3 E.	
	13 7.0 E.	22 0.5 E.		2 18.1 E.		12 12.1 E.		29 11.5 E.		8 5.2 E.	
	14 15.9 E.	23 9.4 E.		4 3.0 E.		13 21.0 E.		30 20.4 E.		9 14.0 E.	
	16 0.7 E.	24 18.2 E.		5 11.9 E.		15 5.9 E.		Nov. 1 5.3 E.		10 22.9 E.	
	17 9.6 E.	26 3.1 E.		6 20.8 E.		16 14.8 E.		2 14.2 E.		12 7.8 E.	
	18 18.5 E.	27 12.0 E.		8 5.7 E.		17 23.7 E.		3 23.1 E.		13 16.7 E.	
	20 3.4 E.	28 20.9 E.		9 14.6 E.		19 8.5 E.		5 8.0 E.		15 1.6 E.	
	21 12.3 E.	Mar. 2 5.8 E.		10 23.5 E.		...		6 16.8 E.		16 10.5 E.	
	22 21.2 E.	3 14.7 E.		12 8.4 E.		...		8 1.7 E.		17 19.3 E.	
	24 6.1 E.	4 23.5 E.		13 17.3 E.		Sept. 30 16.7 E.		9 10.6 E.		19 4.2 E.	
	25 15.0 E.	6 8.4 E.		15 2.2 E.		Oct. 2 1.6 E.		10 19.5 E.		20 13.1 E.	
	26 23.9 E.	7 17.3 E.		16 11.1 E.		3 10.5 E.		12 4.4 E.		21 22.0 E.	
	28 8.8 E.	9 2.2 E.		17 20.0 E.		4 19.4 E.		13 13.3 E.		23 6.8 E.	
	29 17.7 E.	10 11.1 E.		19 4.9 E.		6 4.3 E.		14 22.1 E.		24 15.7 E.	
	31 2.6 E.	11 19.9 E.		20 13.8 E.		7 13.2 E.		16 7.0 E.		26 0.6 E.	
Feb.	1 11.5 E.	13 4.8 E.		21 22.7 E.		8 22.1 E.		17 15.9 E.		27 9.4 E.	
	2 20.4 E.	14 13.7 E.		23 7.6 E.		10 7.0 E.		19 0.8 E.		28 18.3 E.	
	4 5.3 E.	15 22.6 E.		24 16.5 E.		11 15.9 E.		20 9.7 E.		30 3.1 E.	
	5 14.1 E.	17 7.5 E.		26 1.4 E.		13 0.8 E.		21 18.6 E.		31 12.0 E.	
	6 23.0 E.	18 16.4 E.		27 10.3 E.		14 9.7 E.		23 3.4 E.			
	8 7.8 E.	20 1.2 E.		28 19.2 E.		15 18.6 E.		24 12.3 E.			
	9 16.7 E.	21 10.1 E.		30 4.1 E.		17 3.5 E.		25 21.2 E.			

## TETHYS.

Jan.	d h	Feb.	d h	Mar.	d h	Apr.	d h	Oct.	d h	Nov.	d h
	1 4.2 E.	9 19.3 E.		21 10.6 E.		30 2.3 E.		15 4.9 E.		23 20.4 E.	
	3 1.5 E.	11 16.6 E.		23 7.9 E.		May 1 23.6 E.		17 2.2 E.		25 17.7 E.	
	4 22.8 E.	13 13.8 E.		25 5.2 E.		3 20.9 E.		18 23.5 E.		27 15.1 E.	
	6 20.1 E.	15 11.1 E.		27 2.5 E.		5 18.2 E.		20 20.8 E.		29 12.4 E.	
	8 17.4 E.	17 8.4 E.		28 23.8 E.		7 15.6 E.		22 18.2 E.		Dec. 1 9.7 E.	
	10 14.7 E.	19 5.7 E.		30 21.1 E.		9 12.9 E.		24 15.5 E.		3 7.0 E.	
	12 11.9 E.	21 3.0 E.	Apr.	1 18.4 E.		11 10.2 E.		26 12.8 E.		5 4.3 E.	
	14 9.2 E.	23 0.3 E.		3 15.7 E.		13 7.5 E.		28 10.1 E.		7 1.6 E.	
	16 6.5 E.	24 21.6 E.		5 13.0 E.		15 4.9 E.		30 7.5 E.		8 22.9 E.	
	18 3.8 E.	26 18.9 E.		7 10.3 E.		17 2.2 E.		Nov. 1 4.8 E.		10 20.2 E.	
	20 1.1 E.	28 16.2 E.		9 7.6 E.		18 23.5 E.		3 2.1 E.		12 17.5 E.	
	21 22.4 E.	Mar. 2 13.5 E.		11 4.9 E.		...		4 23.4 E.		14 14.8 E.	
	23 19.7 E.	4 10.8 E.		13 2.3 E.		...		6 20.7 E.		16 12.1 E.	
	25 17.0 E.	6 8.1 E.		14 23.6 E.		Sept. 30 2.3 E.		8 18.0 E.		18 9.4 E.	
	27 14.2 E.	8 5.4 E.		16 21.0 E.		Oct. 1 23.6 E.		10 15.3 E.		20 6.7 E.	
	29 11.5 E.	10 2.7 E.		18 18.3 E.		3 20.9 E.		12 12.6 E.		22 4.0 E.	
	31 8.8 E.	12 0.0 E.		20 15.6 E.		5 18.3 E.		14 9.9 E.		24 1.3 E.	
Feb.	2 6.1 E.	13 21.3 E.		22 13.0 E.		7 15.6 E.		16 7.2 E.		25 22.6 E.	
	4 3.4 E.	15 18.7 E.		24 10.3 E.		9 12.9 E.		18 4.5 E.		27 19.9 E.	
	6 0.7 E.	17 16.0 E.		26 7.6 E.		11 10.2 E.		20 1.8 E.		29 17.1 E.	
	7 22.0 E.	19 13.3 E.		28 4.9 E.		13 7.6 E.		21 23.1 E.		30 14.8 E.	



## GREENWICH MEAN TIME.

## DIONE.

Jan.	d h	Feb.	d h	Mar.	d h	May	d h	Oct.	d h	Dec.	d h
	1 6.4 E.		11 7.0 E.		24 8.1 E.		4 9.6 E.		21 5.5 E.		1 6.9 E.
	4 0.0 E.		14 0.6 E.		27 1.8 E.		7 3.4 E.		23 23.2 E.		4 0.6 E.
	6 17.6 E.		16 18.3 E.		29 19.5 E.		9 21.1 E.		26 16.9 E.		6 18.3 E.
	9 11.3 E.		19 11.9 E.	Apr.	1 13.1 E.		12 14.8 E.		29 10.7 E.		9 12.0 E.
	12 4.9 E.		22 5.6 E.		4 6.8 E.		15 8.5 E.	Nov.	1 4.4 E.		12 5.7 E.
	14 22.5 E.		24 23.3 E.		7 0.5 E.		18 2.3 E.		3 22.1 E.		14 23.3 E.
	17 16.2 E.		27 16.9 E.		9 18.2 E.		...		6 15.8 E.		17 17.0 E.
	20 9.8 E.	Mar.	2 10.6 E.		12 11.9 E.		...		9 9.5 E.		20 10.7 E.
	23 3.4 E.		5 4.3 E.		15 5.6 E.	Oct.	2 1.5 E.		12 3.1 E.		23 4.3 E.
	25 21.1 E.		7 22.0 E.		17 23.3 E.		4 19.2 E.		14 20.8 E.		25 22.0 E.
	28 14.7 E.		10 15.7 E.		20 17.1 E.		7 12.9 E.		17 14.5 E.		28 15.6 E.
	31 8.4 E.		13 9.4 E.		23 10.8 E.		10 6.6 E.		20 8.2 E.		31 9.3 E.
Feb.	3 2.0 E.		16 3.0 E.		26 4.5 E.		13 0.4 E.		23 1.9 E.		
	5 19.7 E.		18 20.7 E.		28 22.2 E.		15 18.1 E.		25 19.6 E.		
	8 13.3 E.		21 14.4 E.	May	1 15.9 E.		18 11.8 E.		28 13.2 E.		

## RHEA.

Jan.	d h	Feb.	d h	Mar.	d h	May	d h	Oct.	d h	Nov.	d h
	3 23.9 E.		13 14.7 E.		26 6.1 E.		5 22.5 E.		15 19.0 E.	Nov.	25 11.1 E.
	8 12.2 E.		18 3.1 E.		30 18.6 E.		10 11.0 E.		20 7.5 E.		29 23.5 E.
	13 0.5 E.		22 15.4 E.	Apr.	4 7.0 E.		14 23.6 E.		24 20.0 E.	Dec.	4 11.9 E.
	17 12.8 E.		27 3.8 E.		8 19.5 E.		19 12.1 E.		29 8.4 E.		9 0.3 E.
	22 1.1 E.	Mar.	3 16.1 E.		13 8.0 E.		...	Nov.	2 20.9 E.		13 12.7 E.
	26 13.4 E.		8 4.5 E.		17 20.5 E.		...		7 9.4 E.		18 1.1 E.
	31 1.7 E.		12 16.9 E.		22 9.0 E.	Oct.	2 5.4 E.		11 21.8 E.		22 13.4 E.
Feb.	4 14.1 E.		17 5.3 E.		26 21.5 E.		6 18.0 E.		16 10.3 E.		27 1.8 E.
	9 2.4 E.		21 17.7 E.	May	1 10.0 E.		11 6.5 E.		20 22.7 E.		31 14.1 E.

## TITAN.

Jan.	d h	Feb.	d h	Mar.	d h	May	d h	Oct.	d h	Nov.	d h
	7 5.7 E.		15 16.3 W.		27 18.6 E.		6 10.2 W.		13 16.2 W.	Nov.	22 20.8 E.
	14 21.6 W.		23 22.0 E.	Apr.	4 11.2 W.		14 17.2 E.		21 22.4 E.		30 13.9 W.
	23 3.0 E.	Mar.	3 14.1 W.		12 17.7 E.		...		29 15.9 W.	Dec.	8 19.4 E.
	30 18.9 W.		11 20.1 E.		20 10.5 W.		...	Nov.	6 21.8 E.		16 12.2 W.
Feb.	8 0.4 E.		19 12.4 W.		28 17.2 E.	Oct.	5 22.5 E.		14 15.2 W.		24 17.4 E.

## HYPERION.

Jan.	d h	Feb.	d h	Mar.	d h	May	d h	Oct.	d h	Dec.	d h
	5 12.4 E.		16 15.7 E.		30 22.3 E.		12 10.8 E.		21 3.9 W.		2 23.1 W.
	17 1.5 W.		28 5.3 W.	Apr.	11 13.6 W.		...		31 1.4 E.		12 20.8 E.
	26 13.9 E.	Mar.	9 18.4 E.		21 3.9 E.		...	Nov.	11 14.0 W.		24 7.4 W.
Feb.	7 3.0 W.		21 8.7 W.	May	2 19.7 W.	Oct.	9 14.2 E.		21 11.6 E.		

## IAPETUS.

Jan.	d h	Feb.	d h	Mar.	d h	May	d h	Oct.	d h	Nov.	d h
	10 8.5 E.		17 16.8 W.		29 18.9 E.		8 3.7 W.		17 10.2 W.	Nov.	27 10.3 E.
	30 2.6 I.	Mar.	9 0.5 S.	Apr.	19 1.3 I.		...		6 11.4 S.	Dec.	17 3.2 I.

## DIFFERENTIAL COORDINATES OF PHOEBE.

FOR GREENWICH MEAN NOON.

Date.	$\alpha_{Ph.} - \alpha_{Sat.}$	$\delta_{Ph.} - \delta_{Sat.}$	Date.	$\alpha_{Ph.} - \alpha_{Sat.}$	$\delta_{Ph.} - \delta_{Sat.}$	Date.	$\alpha_{Ph.} - \alpha_{Sat.}$	$\delta_{Ph.} - \delta_{Sat.}$
	m s	' "		m s	' "		m s	' "
Jan. 0	+2 9.7	-6 15	Apr. 14	+1 47.5	-1 30	Sept. 20	-1 48.4	+ 8 34
2	2 11.6	6 14	16	1 45.2	1 24	22	1 50.3	8 41
4	2 13.3	6 12	18	1 42.8	1 18	24	1 52.2	8 48
6	2 15.0	6 10	20	1 40.4	1 12	26	1 54.1	8 54
8	2 16.6	6 7	22	1 37.9	1 6	28	1 55.9	9 0
10	+2 18.1	-6 4	24	+1 35.4	-1 0	Oct. 30	-1 57.6	+ 9 6
12	2 19.5	6 1	26	1 32.8	0 54	2	1 59.3	9 12
14	2 20.8	5 58	28	1 30.2	0 48	4	2 1.0	9 18
16	2 22.0	5 54	30	1 27.6	0 42	6	2 2.6	9 23
18	2 23.0	5 50	May 2	1 25.0	0 36	8	2 4.2	9 28
20	+2 24.0	-5 46	4	+1 22.3	-0 29	10	-2 5.7	+ 9 33
22	2 24.9	5 41	6	1 19.6	0 23	12	2 7.2	9 38
24	2 25.7	5 36	8	1 16.8	0 17	14	2 8.6	9 42
26	2 26.4	5 31	10	1 14.0	0 11	16	2 9.9	9 46
28	2 27.0	5 26	12	1 11.2	-0 5	18	2 11.2	9 50
30	+2 27.6	-5 21	14	+1 8.4	+0 2	20	-2 12.5	+ 9 54
Feb. 1	2 28.0	5 16	16	1 5.5	0 8	22	2 13.7	9 57
3	2 28.3	5 10	18	1 2.7	0 15	24	2 14.9	10 0
5	2 28.5	5 4	20	0 59.8	0 21	26	2 16.0	10 2
7	2 28.7	4 58	22	0 56.9	0 28	28	2 17.0	10 4
9	+2 28.7	-4 52	24	+0 53.9	+0 34	Nov. 30	-2 18.0	+10 6
11	2 28.6	4 46	26	0 51.0	0 41	1	2 19.0	10 8
13	2 28.5	4 40	28	0 48.0	0 48	3	2 19.8	10 9
15	2 28.2	4 33	30	0 45.1	0 54	5	2 20.6	10 10
17	2 27.9	4 27	June 1	0 42.1	1 1	7	2 21.4	10 11
19	+2 27.5	-4 21	3	+0 39.1	+1 8	9	-2 22.1	+10 11
21	2 27.0	4 14	5	0 36.1	1 15	11	2 22.8	10 11
23	2 26.4	4 8	7	0 33.0	1 23	13	2 23.4	10 11
25	2 25.7	4 1	9	0 30.0	1 30	15	2 23.9	10 10
27	2 25.0	3 55	11	0 27.0	1 37	17	2 24.4	10 9
Mar. 1	+2 24.1	-3 48	13	+0 24.0	+1 44	19	-2 24.8	+10 8
3	2 23.2	3 42	15	0 20.9	1 52	21	2 25.1	10 6
5	2 22.2	3 35	17	0 17.9	2 0	23	2 25.4	10 4
7	2 21.1	3 28	19	0 14.9	2 7	25	2 25.6	10 1
9	2 20.0	3 22	21	0 11.8	2 15	27	2 25.8	9 58
11	+2 18.7	-3 16	23	+0 8.8	+2 23	Dec. 29	-2 25.9	+ 9 55
13	2 17.4	3 9	25	0 5.8	2 31	1	2 25.9	9 51
15	2 16.0	3 3	27	+0 2.8	+2 39	3	2 25.9	9 47
17	2 14.6	2 56		....	....	5	2 25.8	9 43
19	2 13.0	2 50		....	....	7	2 25.6	9 38
21	+2 11.4	-2 44	Aug. 27	-1 22.3	+7 2	9	-2 25.3	+ 9 33
23	2 9.8	2 37	29	1 24.7	7 10	11	2 25.0	9 27
25	2 8.0	2 31	31	1 27.0	7 18	13	2 24.6	9 21
27	2 6.2	2 25	Sept. 2	1 29.3	7 26	15	2 24.2	9 15
29	2 4.4	2 19	4	1 31.6	7 34	17	2 23.6	9 8
31	+2 2.5	-2 12	6	-1 33.8	+7 42	19	-2 23.0	+ 9 1
Apr. 2	2 0.5	2 6	8	1 36.0	7 50	21	2 22.4	8 53
4	1 58.5	2 0	10	1 38.2	7 58	23	2 21.6	8 46
6	1 56.4	1 54	12	1 40.3	8 5	25	2 20.8	8 38
8	1 54.3	1 48	14	1 42.4	8 13	27	2 19.9	8 29
10	+1 52.1	-1 42	16	-1 44.4	+8 20	29	-2 18.9	+ 8 20
12	+1 49.8	-1 36	18	-1 46.5	+8 27	31	-2 17.8	+ 8 11

Time from Eastern Elongation.	Mimas.		Time from Eastern Elongation.	Enceladus.		Tethys.		Time from Eastern Elongation.	Dione.	
	$p^1$	$F$		$p^1$	$F$	$p^1$	$F$		$p^1$	$F$
h	.		d h	.		.		d h	.	
0.0	83.2	1.000	0 0	83.2	1.000	83.2	1.000	0 0	83.2	1.000
0.5	80.4	0.992	0 1	79.1	0.984	80.1	0.992	0 2	79.1	0.984
1.0	77.4	0.967	0 2	74.7	0.938	77.0	0.967	0 4	74.7	0.938
1.5	74.3	0.926	0 3	69.8	0.864	73.6	0.928	0 6	69.7	0.864
2.0	70.8	0.870	0 4	63.6	0.766	69.8	0.874	0 8	63.6	0.765
2.5	66.8	0.801	0 5	55.6	0.652	65.6	0.807	0 10	55.5	0.651
3.0	62.0	0.721	0 6	43.9	0.532	60.4	0.730	0 12	43.7	0.532
3.5	55.8	0.634	0 7	25.9	0.428	54.0	0.647	0 14	25.7	0.427
4.0	47.7	0.544	0 8	359.7	0.372	45.6	0.562	0 16	359.4	0.372
4.5	36.5	0.460	0 9	331.1	0.395	34.4	0.482	0 18	330.8	0.396
5.0	20.7	0.391	0 10	309.4	0.482	19.1	0.418	0 20	309.3	0.484
5.5	0.1	0.355	0 11	295.4	0.598	359.9	0.384	0 22	295.3	0.600
6.0	337.9	0.363	0 12	286.0	0.717	339.4	0.392	1 0	285.9	0.719
6.5	319.0	0.414	0 13	279.1	0.823	321.4	0.437	1 2	279.0	0.825
7.0	305.1	0.491	0 14	273.7	0.908	307.7	0.508	1 4	273.6	0.910
7.5	295.2	0.579	0 15	269.1	0.968	297.5	0.591	1 6	269.1	0.968
8.0	288.0	0.668	0 16	265.0	0.997	289.9	0.676	1 8	264.9	0.997
8.5	282.4	0.753	0 17	260.9	0.995	284.0	0.758	1 10	260.8	0.994
9.0	277.9	0.829	0 18	256.7	0.962	279.2	0.831	1 12	256.6	0.961
9.5	274.1	0.893	0 19	252.0	0.900	275.1	0.834	1 14	251.9	0.898
10.0	270.8	0.943	0 20	246.5	0.812	271.6	0.943	1 16	246.3	0.809
10.5	267.8	0.978	0 21	239.5	0.704	268.3	0.978	1 18	239.2	0.701
11.0	264.9	0.997	0 22	229.6	0.585	265.2	0.995	1 20	229.3	0.582
11.5	262.1	0.999	0 23	214.8	0.470	262.1	0.999	1 22	214.2	0.468
12.0	259.2	0.984	1 0	192.2	0.388	259.0	0.985	2 0	191.3	0.387
12.5	256.3	0.953	1 1	163.3	0.374	255.8	0.955	2 2	162.4	0.376
13.0	253.0	0.906	1 2	138.0	0.438	252.3	0.910	2 4	137.3	0.442
13.5	249.4	0.845	1 3	120.9	0.546	248.4	0.852	2 6	120.4	0.550
14.0	245.1	0.772	1 4	109.7	0.665	243.9	0.781	2 8	109.4	0.670
14.5	239.8	0.689	1 5	101.9	0.778	238.4	0.702	2 10	101.7	0.782
15.0	233.0	0.600	1 6	96.0	0.874	231.4	0.617	2 12	95.8	0.877
15.5	223.9	0.511	1 7	91.1	0.945	222.1	0.533	2 14	90.9	0.947
16.0	211.1	0.431	1 8	86.8	0.988	209.6	0.457	2 16	86.6	0.989
16.5	193.3	0.372	1 9	82.7	1.000	192.9	0.402	2 18	82.5	1.000
17.0	171.5	0.352	1 10			172.8	0.382			
17.5	150.1	0.379	1 11			152.7	0.404			
18.0	133.1	0.441	1 12			136.2	0.460			
18.5	121.0	0.524	1 13			123.8	0.536			
19.0	112.2	0.613	1 14			114.7	0.620			
19.5	105.7	0.701	1 15			107.8	0.705			
20.0	100.6	0.783	1 16			102.3	0.784			
20.5	96.4	0.854	1 17			97.7	0.854			
21.0	92.8	0.914	1 18			93.8	0.912			
21.5	89.6	0.958	1 19			90.4	0.957			
22.0	86.7	0.987	1 20			87.2	0.986			
22.5	83.8	1.000	1 21			84.1	0.999			
23.0	81.0	0.995	1 22			81.1	0.996			

Position angle of satellite  $p = p^1 + (P - P_0)$ .Apparent distance of satellite  $s = F \frac{a(p)}{p}$ .

Time from Eastern Elongation.	Rhea.		Time from Eastern Elongation.	Titan.		Hyperion.		Time from Eastern Elongation.	Iapetus.	
	$p^1$	$F$		$p^1$	$F$	$p^1$	$F$		$p^1$	$F$
d h	.		d h	.		.		d	.	
0 0	83.2	1.000	0 0	83.2	0.994	83.2	1.007	0	84.5	1.025
0 3	79.4	0.987	0 10	79.6	0.978	80.6	1.010	2	83.4	1.011
0 6	75.4	0.949	0 20	75.9	0.938	78.0	1.000	4	82.2	0.974
0 9	71.0	0.887	1 6	71.7	0.876	75.3	0.978	6	80.8	0.913
0 12	65.8	0.804	1 16	66.8	0.795	72.4	0.945	8	79.2	0.832
0 15	59.3	0.706	2 2	60.6	0.698	69.3	0.901	10	77.3	0.732
0 18	50.4	0.599	2 12	52.3	0.592	65.9	0.849	12	74.6	0.614
0 21	37.8	0.494	2 22	40.3	0.487	61.9	0.789	14	70.6	0.484
1 0	19.1	0.410	3 8	22.4	0.399	57.3	0.723	16	63.5	0.345
1 3	354.1	0.375	3 18	357.8	0.357	51.7	0.654	18	46.8	0.210
1 6	328.8	0.405	4 4	331.4	0.379	44.8	0.584	20	357.2	0.130
1 9	309.7	0.487	4 14	311.2	0.456	36.0	0.518	22	304.1	0.200
1 12	296.6	0.591	5 0	297.6	0.559	24.9	0.461	24	286.0	0.333
1 15	287.6	0.699	5 10	288.3	0.666	11.1	0.419	26	278.4	0.471
1 18	280.9	0.798	5 20	281.6	0.767	355.3	0.402	28	274.2	0.601
1 21	275.7	0.882	6 6	276.4	0.855	339.2	0.412	30	271.4	0.717
2 0	271.2	0.945	6 16	272.0	0.925	324.6	0.447	32	269.4	0.812
2 3	267.2	0.985	7 2	268.2	0.974	312.7	0.499	34	267.8	0.891
2 6	263.4	1.000	7 12	264.7	1.001	303.3	0.563	36	266.4	0.944
2 9	259.7	0.989	7 22	261.3	1.003	295.9	0.632	38	265.1	0.971
2 12	255.7	0.952	8 8	257.8	0.984	289.9	0.701	40	263.8	0.972
2 15	251.4	0.892	8 18	254.1	0.943	285.0	0.767	42	262.5	0.948
2 18	246.2	0.811	9 4	250.0	0.881	280.8	0.827	44	261.2	0.899
2 21	239.8	0.713	9 14	245.1	0.803	277.2	0.880	46	259.6	0.827
3 0	231.2	0.606	10 0	239.1	0.712	273.9	0.923	48	257.6	0.734
3 3	218.8	0.500	10 10	231.2	0.613	271.0	0.956	50	255.0	0.623
3 6	200.6	0.414	10 20	220.2	0.515	268.1	0.977	52	251.2	0.499
3 9	176.0	0.375	11 6	204.6	0.431	265.4	0.985	54	244.7	0.365
3 12	150.4	0.401	11 16	183.3	0.382	262.6	0.980	56	230.6	0.233
3 15	130.8	0.480	12 2	159.4	0.387	259.8	0.962	58	190.6	0.138
3 18	117.4	0.583	12 12	138.8	0.442	256.9	0.929	60	133.0	0.178
3 21	108.2	0.691	12 22	124.0	0.529	253.7	0.884	62	110.0	0.300
4 0	101.4	0.791	13 8	113.5	0.628	250.1	0.826	64	100.9	0.435
4 3	96.0	0.876	13 18	106.0	0.725	245.8	0.757	66	96.1	0.566
4 6	91.5	0.942	14 4	100.2	0.814	240.7	0.679	68	93.0	0.686
4 9	87.5	0.983	14 14	95.4	0.889	234.2	0.595	70	90.8	0.792
4 12	83.7	1.000	15 0	91.3	0.945	225.4	0.510	72	89.1	0.880
4 15	79.9	0.990	15 10	87.6	0.981	213.2	0.431	74	87.7	0.949
			15 20	84.1	0.995	196.8	0.373	76	86.4	0.996
			16 6	80.6	0.984	176.0	0.355	78	85.3	1.021
			16 16			154.5	0.363	80	84.1	1.023
			17 2			136.8	0.417			
			17 12			123.9	0.492			
			17 22			114.5	0.576			
			18 8			107.6	0.662			
			18 18			102.2	0.742			
			19 4			97.8	0.816			
			19 14			94.2	0.879			
			20 0			90.9	0.930			
			20 10			88.0	0.969			
			20 20			85.3	0.995			
			21 6			82.6	1.008			

Position angle of satellite  $p = p^1 + (P - P_0)$ .Apparent distance of satellite  $s = F \frac{a(e)}{p}$ .

FOR GREENWICH MEAN MIDNIGHT.

Date.	Mimas.		Enceladus.		Tethys.		Dione.	
	$P-P_0$	$\frac{a(p)}{\rho}$	$P-P_0$	$\frac{a(p)}{\rho}$	$P-P_0$	$\frac{a(p)}{\rho}$	$P-P_0$	$\frac{a(p)}{\rho}$
	"	"	"	"	"	"	"	"
Jan. 1	+0.5	31.5	-0.5	40.4	+0.4	50.0	-0.6	64.1
6	0.7	31.6	0.5	40.5	0.4	50.2	0.6	64.3
11	0.8	31.6	0.5	40.6	0.3	50.3	0.6	64.4
16	0.8	31.7	0.5	40.6	0.3	50.3	0.6	64.4
21	0.9	31.7	0.5	40.6	0.3	50.3	0.6	64.4
26	+1.0	31.6	-0.5	40.6	+0.3	50.2	-0.6	64.3
31	1.1	31.5	0.5	40.5	0.3	50.1	0.6	64.1
Feb. 5	1.2	31.4	0.5	40.3	0.3	49.9	0.6	63.9
10	1.2	31.3	0.5	40.2	0.3	49.7	0.5	63.7
15	1.2	31.2	0.5	40.0	0.3	49.5	0.5	63.4
20	+1.3	31.0	-0.5	39.7	+0.3	49.2	-0.5	63.0
25	1.3	30.8	0.5	39.5	0.3	48.9	0.5	62.6
Mar. 2	1.3	30.6	0.5	39.2	0.3	48.5	0.5	62.1
7	1.3	30.3	0.5	38.9	0.3	48.2	0.5	61.7
12	1.2	30.1	0.5	38.6	0.2	47.8	0.5	61.2
17	+1.2	29.8	-0.5	38.3	+0.2	47.4	-0.5	60.7
22	1.2	29.6	0.5	37.9	0.2	46.9	0.5	60.1
27	1.1	29.3	0.5	37.6	0.2	46.5	0.5	59.6
Apr. 1	1.0	29.0	0.4	37.2	0.2	46.1	0.5	59.0
6	0.9	28.8	0.4	36.9	0.2	45.7	0.5	58.5
11	+0.8	28.5	-0.5	36.6	+0.1	45.3	-0.5	58.0
16	0.7	28.2	0.5	36.2	0.1	44.8	0.5	57.4
21	0.6	28.0	0.5	35.9	0.1	44.4	0.5	56.9
26	0.5	27.7	0.5	35.6	+0.1	44.0	0.5	56.4
May 1	0.3	27.5	0.5	35.3	0.0	43.7	0.5	55.9
6	+0.2	27.3	-0.5	35.0	0.0	43.3	-0.5	55.4
11	0.0	27.0	-0.5	34.7	0.0	42.9	-0.6	55.0
..	..	...	..	...	..	...	..	...
Oct. 7	-1.1	26.8	-0.2	34.4	-0.7	42.6	-0.3	54.6
12	1.0	27.0	0.2	34.7	0.7	42.9	0.3	55.0
17	-0.8	27.3	-0.2	35.0	-0.7	43.3	-0.3	55.4
22	0.6	27.5	0.2	35.3	0.7	43.7	0.3	55.9
27	0.5	27.7	0.2	35.6	0.7	44.0	0.3	56.4
Nov. 1	0.3	28.0	0.2	35.9	0.8	44.4	0.3	56.9
6	-0.2	28.2	0.2	36.2	0.8	44.8	0.2	57.4
11	0.0	28.5	-0.2	36.6	-0.8	45.3	-0.2	58.0
16	+0.2	28.8	0.2	36.9	0.8	45.7	0.2	58.5
21	0.3	29.0	0.2	37.2	0.8	46.1	0.2	59.0
26	0.4	29.3	0.2	37.6	0.8	46.5	0.2	59.6
Dec. 1	0.6	29.5	0.2	37.9	0.8	46.9	0.2	60.1
6	+0.7	29.8	-0.2	38.2	-0.8	47.3	-0.2	60.6
11	0.8	30.0	0.2	38.5	0.9	47.7	0.2	61.1
16	0.9	30.3	0.2	38.8	0.9	48.1	0.3	61.6
21	1.0	30.5	0.2	39.1	0.9	48.4	0.3	62.0
26	1.1	30.7	0.2	39.4	0.9	48.7	0.3	62.4
31	+1.1	30.9	-0.2	39.6	-1.0	49.0	-0.3	62.8

## FOR GREENWICH MEAN MIDNIGHT.

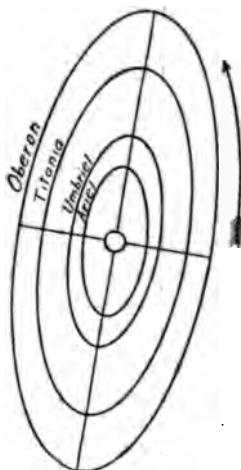
Date.	Rhea.		Titan.		Hyperion.		Iapetus.	
	$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$	$P-P_0$	$\frac{a(\rho)}{\rho}$
	"	"	"	"	"	"	"	"
Jan. 1	-0.3	89.5	-0.1	208	+0.2	251	+0.3	605
6	0.3	89.7	0.1	208	0.2	252	0.2	606
11	0.3	89.9	0.1	208	0.2	252	+0.1	607
16	0.3	90.0	0.1	208	0.2	253	0.0	608
21	0.3	89.9	0.1	208	0.2	252	-0.1	607
26	-0.3	89.8	-0.1	208	+0.3	252	-0.2	607
31	0.3	89.6	0.1	208	0.3	252	0.3	605
Feb. 5	0.3	89.3	0.1	207	0.3	251	0.4	603
10	0.3	88.9	0.1	206	0.3	250	0.4	601
15	0.3	88.5	0.1	205	0.3	248	0.5	598
20	-0.3	88.0	-0.1	204	+0.3	247	-0.6	594
25	0.3	87.4	0.1	203	0.3	246	0.6	591
Mar. 2	0.3	86.8	0.1	201	0.3	244	0.7	586
7	0.3	86.1	0.1	200	0.3	242	0.8	582
12	0.3	85.4	0.1	198	0.3	240	0.8	577
17	-0.3	84.7	-0.1	196	+0.3	238	-0.8	572
22	0.3	84.0	0.1	195	0.3	236	0.8	567
27	0.3	83.2	0.1	193	0.3	234	0.8	562
Apr. 1	0.3	82.4	0.1	191	0.3	232	0.8	557
6	0.3	81.7	0.1	189	0.3	230	0.8	552
11	-0.3	80.9	-0.1	188	+0.3	227	-0.8	547
16	0.3	80.2	0.1	186	0.3	225	0.7	542
21	0.3	79.5	0.1	184	0.3	223	0.7	537
26	0.3	78.8	0.1	183	0.3	221	0.6	532
May 1	0.3	78.1	0.1	181	0.3	219	0.5	528
6	-0.3	77.4	-0.1	180	+0.3	218	-0.4	523
11	-0.3	76.8	-0.1	178	+0.2	216	-0.4	519
..	..	..	..	..	..	..	..	..
Oct. 7	-0.2	76.2	+0.2	177	+0.4	214	+3.9	515
12	0.2	76.8	0.2	178	0.4	216	4.0	519
17	-0.2	77.4	+0.2	180	+0.4	218	+4.1	523
22	0.2	78.1	0.2	181	0.4	219	4.1	528
27	0.2	78.8	0.2	183	0.4	221	4.2	532
Nov. 1	0.2	79.5	0.2	184	0.4	223	4.3	537
6	0.2	80.2	0.2	186	0.4	225	4.3	542
11	-0.2	80.9	+0.2	188	+0.4	227	+4.4	547
16	0.2	81.7	0.2	189	0.4	230	4.4	552
21	0.2	82.4	0.2	191	0.4	232	4.4	557
26	0.2	83.2	0.2	193	0.4	234	4.4	562
Dec. 1	0.2	83.9	0.2	194	0.4	236	4.4	567
6	-0.2	84.6	+0.2	196	+0.4	238	+4.4	572
11	0.2	85.3	0.2	198	0.4	240	4.4	576
16	0.2	86.0	0.2	199	0.4	242	4.3	581
21	0.2	86.6	0.2	201	0.4	243	4.3	585
26	0.2	87.2	0.2	202	0.4	245	4.2	589
31	-0.2	87.7	+0.2	203	+0.4	246	+4.2	582

APPARENT ORBITS OF THE SATELLITES OF URANUS AT DATE OF OPPOSITION,  
AUGUST 14, 1917, AS SEEN IN AN INVERTING TELESCOPE.

South

*Apparent Apsides.*

Date.	Position Angle.	App. Distances.	
		Ariel.	Umbriel.
May 7	349.6	13.2	18.4
Aug. 15	350.2	13.9	19.4
Nov. 23	350.8	13.1	18.3



*Apparent Apsides.*

Date.	Position Angle.	App. Distances.	
		Titania.	Oberon.
May 7	349.6	30.1	40.3
Aug. 15	350.2	31.9	42.6
Nov. 23	350.8	30.0	40.1

North

### GREENWICH MEAN TIME OF GREATEST ELONGATION.

ARIEL.		UMBRIEL.		TITANIA.		OBERON.
North.	South.	North.	South.	North.	South.	North and South.
May 16 9.4	May 20 4.1	May 8 4.7	May 10 6.4	May 8 10.9	May 12 19.3	May 28 23.5 N.
23 22.8	27 17.5	16 11.6	18 13.3	17 3.8	21 12.2	June 4 17.18.
31 12.3	June 4 7.0	24 18.5	26 20.2	25 20.7	30 5.1	11 10 6 N.
June 8 1.7	11 20.4	June 2 1.4	June 4 3.1	June 3 13.6	June 7 22.1	18 4.28.
15 15.2	19 9.9	10 8.3	12 10.0	12 6.5	16 15.0	24 21.8 N.
23 4.6	26 23.4	18 15.2	20 17.0	20 23.5	25 8.0	July 1 15.38.
30 18.1	July 4 12.8	26 22.1	28 23.9	29 16.4	July 4 0.9	8 8.9 N.
July 8 7.6	12 2.3	July 5 5.1	July 7 6.8	July 8 9.4	12 17.9	15 2.58.
15 21.0	19 15.8	13 12.0	15 13.7	17 2.4	21 10.8	21 20.1 N.
23 10.5	27 5.2	21 18.9	23 20.6	25 19.3	30 3.8	28 13.78.
31 0.0	Aug. 3 18.7	30 1.8	Aug. 1 3.6	Aug. 3 12.3	Aug. 7 20.8	Aug. 4 7.3 N.
Aug. 7 13.4	11 8.2	Aug. 7 8.8	9 10.5	12 5.2	16 13.7	11 0.98.
15 2.9	18 21.6	15 15.7	17 17.4	20 22.2	25 6.7	17 18.5 N.
22 16.4	26 11.1	23 22.6	26 0.4	29 15.2	Sept. 2 23.7	24 12.18.
30 5.9	Sept. 3 0.6	Sept. 1 5.6	Sept. 3 7.3	Sept. 7 8.2	11 16.7	31 5.7 N.
Sept. 6 19.3	10 14.1	9 12.5	11 14.2	16 1.2	20 9.6	Sept. 6 23.38.
14 8.8	18 3.6	17 19.4	19 21.2	24 18.1	29 2.6	13 16.9 N.
21 22.3	25 17.0	26 2.4	28 4.1	Oct. 3 11.1	Oct. 7 19.6	20 10.58.
29 11.8	Oct. 3 6.5	Oct. 4 9.3	Oct. 6 11.1	12 4.1	16 12.6	27 4.1 N.
Oct. 7 1.3	10 20.0	12 16.3	14 18.0	20 21.0	25 5.5	Oct. 3 21.78.
14 14.8	18 9.5	20 23.2	23 1.0	29 14.0	Nov. 2 22.5	10 15.2 N.
22 4.2	25 23.0	29 6.2	31 7.9	Nov. 7 7.0	11 15.4	17 8.88.
29 17.7	Nov. 2 12.5	Nov. 6 13.1	Nov. 8 14.8	15 23.9	20 8.4	24 2.4 N.
Nov. 6 7.2	10 1.9	14 20.0	16 21.8	24 16.9	29 1.3	30 20.08.
13 20.7	17 15.4	23 3.0	25 4.7	Dec. 3 9.8	Dec. 7 18.3	Nov. 6 13.6 N.

In the above diagram the central circle represents the planet.

For Ariel every third greatest elongation is given, and for Umbriel every alternate one; the intermediate ones may be found by adding multiples of the period of the satellite.

Sidereal period of Ariel, 2<sup>d</sup> 12<sup>h</sup>.489; of Umbriel, 4<sup>d</sup> 3<sup>h</sup>.460; of Titania, 8<sup>d</sup> 16<sup>h</sup>.941; of Oberon, 13<sup>d</sup> 11<sup>h</sup>.118.

Time from Northern Elongation.		Ariel.		Umbriel.		Time from Northern Elongation.		Titania.		Time from Northern Elongation.		Oberon.	
		$p^1$	$F$	$p^1$	$F$			$p^1$	$F$			$p^1$	$F$
d	h	.	.	.	.	d	h	.	.	d	h	.	.
0	0	350.2	1.000	350.2	1.000	0	0	350.2	1.000	0	0	350.2	1.000
0	2	355.2	0.982	353.2	0.993	0	5	353.8	0.991	0	8	354.0	0.990
0	4	0.6	0.930	356.3	0.974	0	10	357.6	0.963	0	16	357.8	0.960
0	6	6.8	0.847	359.6	0.942	0	15	1.6	0.918	1	0	2.0	0.912
0	8	14.6	0.741	3.2	0.898	0	20	6.1	0.857	1	8	6.8	0.848
0	10	25.4	0.621	7.1	0.843	1	1	11.4	0.783	1	16	12.5	0.770
0	12	41.2	0.507	11.7	0.780	1	6	17.9	0.700	2	0	19.5	0.682
0	14	64.5	0.429	17.1	0.711	1	11	26.3	0.613	2	8	28.7	0.592
0	16	92.6	0.423	23.7	0.637	1	16	37.3	0.529	2	16	41.0	0.507
0	18	116.8	0.494	32.1	0.564	1	21	52.2	0.459	3	0	57.7	0.443
0	20	133.4	0.606	42.8	0.498	2	2	71.0	0.420	3	8	78.1	0.416
0	22	144.6	0.726	56.4	0.447	2	7	91.6	0.422	3	16	99.0	0.434
1	0	152.8	0.835	72.7	0.418	2	12	110.0	0.466	4	0	116.5	0.493
1	2	159.1	0.922	90.0	0.420	2	17	124.4	0.537	4	8	129.6	0.575
1	4	164.6	0.978	106.0	0.452	2	22	135.2	0.622	4	16	139.4	0.665
1	6	169.6	1.000	119.2	0.507	3	3	143.2	0.710	5	0	146.7	0.753
1	8	174.6	0.986	129.6	0.574	3	8	149.6	0.792	5	8	152.6	0.833
1	10	179.9	0.938	137.7	0.647	3	13	154.8	0.864	5	16	157.5	0.901
1	12	186.0	0.859	144.1	0.720	3	18	159.3	0.924	6	0	161.8	0.953
1	14	193.6	0.755	149.4	0.789	3	23	163.3	0.967	6	8	165.8	0.986
1	16	203.9	0.636	153.9	0.851	4	4	167.0	0.993	6	16	169.5	1.000
1	18	218.9	0.519	157.8	0.904	4	9	170.6	1.000	7	0	173.2	0.994
1	20	241.2	0.435	161.3	0.947	4	14	174.2	0.989	7	8	177.0	0.968
1	22	269.2	0.419	164.5	0.977	4	19	178.0	0.959	7	16	181.2	0.923
2	0	294.2	0.482	167.6	0.995	5	0	182.0	0.912	8	0	185.8	0.862
2	2	311.7	0.591	170.6	1.000	5	5	186.6	0.850	8	8	191.3	0.786
2	4	323.5	0.712	173.6	0.992	5	10	192.1	0.775	8	16	198.0	0.700
2	6	331.9	0.823	176.8	0.970	5	15	198.7	0.691	9	0	206.7	0.609
2	8	338.4	0.913	180.1	0.936	5	20	207.3	0.604	9	8	218.3	0.523
2	10	344.0	0.972	183.7	0.891	6	1	218.7	0.520	9	16	234.1	0.453
2	12	349.0	0.999	187.7	0.835	6	6	234.0	0.454	10	0	253.9	0.418
2	14	354.0	0.990	192.4	0.771	6	11	253.2	0.418	10	8	275.1	0.427
2	16			197.9	0.701	6	16	273.7	0.425	10	16	293.4	0.479
2	18			204.7	0.627	6	21	291.8	0.472	11	0	307.4	0.557
2	20			213.4	0.555	7	2	305.7	0.546	11	8	317.6	0.647
2	22			224.5	0.490	7	7	316.1	0.632	11	16	325.4	0.736
3	0			238.5	0.441	7	12	324.0	0.718	12	0	331.6	0.819
3	2			255.0	0.417	7	17	330.2	0.800	12	8	336.6	0.889
3	4			272.3	0.423	7	22	335.3	0.871	12	16	341.0	0.944
3	6			288.0	0.458	8	3	339.7	0.929	13	0	345.0	0.981
3	8			300.8	0.515	8	8	343.7	0.970	13	8	348.8	0.998
3	10			310.8	0.584	8	13	347.4	0.994	13	16	352.5	0.996
3	12			318.6	0.657	8	18	351.0	1.000				
3	14			324.9	0.730								
3	16			330.0	0.798								
3	18			334.4	0.859								
3	20			338.3	0.911								
3	22			341.7	0.952								
4	0			345.0	0.980								
4	2			348.0	0.997								
4	4			351.0	1.000								

Position angle of satellite  $p = p^1 + (P - P_0)$ .Apparent distance of satellite  $s = F \frac{p^1(p)}{p}$ .



FOR GREENWICH MEAN NOON.

Date.	P-P <sub>0</sub>	$\frac{\alpha(p)}{p}$				Date.	P-P <sub>0</sub>	$\frac{\alpha(p)}{p}$			
		Ariel.	Umbriel.	Titania.	Oberon.			Ariel.	Umbriel.	Titania.	Oberon.
	°	"	"	"	"		°	"	"	"	"
Apr. 20	-0.4	13.0	18.1	29.7	39.7	Aug. 18	0.0	13.9	19.4	31.9	42.6
25	0.5	13.0	18.2	29.8	39.9	23	+0.1	13.9	19.4	31.8	42.6
30	0.5	13.1	18.2	29.9	40.0	28	0.2	13.9	19.4	31.8	42.5
May 5	0.6	13.2	18.3	30.1	40.2	Sept. 2	0.2	13.9	19.4	31.8	42.5
10	0.6	13.2	18.4	30.2	40.4	7	0.3	13.9	19.3	31.7	42.4
15	-0.6	13.3	18.5	30.3	40.5	12	+0.4	13.8	19.3	31.6	42.3
20	0.6	13.3	18.6	30.4	40.7	17	0.4	13.8	19.2	31.6	42.2
25	0.6	13.4	18.6	30.6	40.9	22	0.5	13.8	19.2	31.5	42.1
30	0.6	13.4	18.7	30.7	41.0	27	0.5	13.7	19.1	31.4	42.0
June 4	0.6	13.5	18.8	30.8	41.2	Oct. 2	0.6	13.7	19.1	31.3	41.9
9	-0.6	13.5	18.9	30.9	41.4	7	+0.6	13.6	19.0	31.2	41.7
14	0.6	13.6	18.9	31.0	41.5	12	0.6	13.6	18.9	31.1	41.6
19	0.6	13.6	19.0	31.2	41.7	17	0.6	13.5	18.9	31.0	41.4
24	0.6	13.7	19.1	31.3	41.8	22	0.6	13.5	18.8	30.8	41.2
29	0.5	13.7	19.1	31.4	42.0	27	0.6	13.4	18.7	30.7	41.1
July 4	-0.5	13.8	19.2	31.5	42.1	Nov. 1	+0.6	13.4	18.6	30.6	40.9
9	0.4	13.8	19.2	31.6	42.2	6	0.6	13.3	18.6	30.4	40.7
14	0.4	13.8	19.3	31.6	42.3	11	0.6	13.3	18.5	30.3	40.5
19	0.3	13.9	19.3	31.7	42.4	16	0.6	13.2	18.4	30.2	40.4
24	0.3	13.9	19.4	31.8	42.5	21	0.6	13.1	18.3	30.0	40.2
29	-0.2	13.9	19.4	31.8	42.5	26	+0.5	13.1	18.2	29.9	40.0
Aug. 3	0.2	13.9	19.4	31.8	42.6	Dec. 1	0.5	13.0	18.2	29.8	39.9
8	-0.1	13.9	19.4	31.8	42.6	6	0.4	13.0	18.1	29.7	39.7
13	0.0	13.9	19.4	31.9	42.6	11	+0.4	12.9	18.0	29.6	39.6

SATELLITE OF NEPTUNE, 1917.

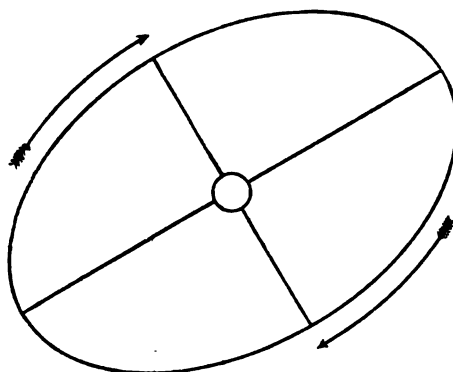
Time from Eastern Elongation.		p <sup>1</sup>	F	Time from Eastern Elongation.		p <sup>1</sup>	F	Date.	P-P <sub>0</sub>	$\frac{\alpha(p)}{p}$	Date.	P-P <sub>0</sub>	$\frac{\alpha(p)}{p}$
d	h	°		d	h	°			°	"		°	"
0	0	120.1	1.000	3	0	297.8	0.999	Jan. 1	+0.7	16.8	May 1	-1.5	16.2
0	3	115.3	0.995	3	3	292.8	0.988	6	0.5	16.8	6	1.4	16.1
0	6	110.3	0.979	3	6	287.8	0.967	11	0.4	16.8	11	1.4	16.1
0	9	105.1	0.953	3	9	282.4	0.937	16	0.2	16.8	16	1.3	16.0
0	12	99.6	0.918	3	12	276.7	0.899	21	+0.1	16.8	21	-1.2	16.0
0	15	93.6	0.877	3	15	270.4	0.855	26	-0.1	16.8	Oct. 2	+3.5	16.0
0	18	86.9	0.831	3	18	263.4	0.807	31	0.2	16.8	7	3.6	16.0
0	21	79.5	0.782	3	21	255.4	0.758	Feb. 5	0.4	16.8	12	3.6	16.1
1	0	71.0	0.734	4	0	246.4	0.712	10	0.6	16.8	17	3.7	16.1
1	3	61.5	0.692	4	3	236.4	0.674	15	0.7	16.8	22	3.8	16.2
1	6	50.8	0.658	4	6	225.2	0.646	20	-0.8	16.7	27	+3.8	16.2
1	9	39.2	0.638	4	9	213.3	0.634	25	1.0	16.7	Nov. 1	3.9	16.3
1	12	27.2	0.634	4	12	201.2	0.638	Mar. 2	1.1	16.7	6	3.9	16.3
1	15	15.3	0.646	4	15	189.6	0.658	7	1.2	16.6	11	3.9	16.4
1	18	4.1	0.673	4	18	179.0	0.691	12	1.3	16.6	16	3.9	16.4
1	21	354.0	0.712	4	21	169.4	0.734	17	-1.4	16.6	21	+3.8	16.5
2	0	345.0	0.758	5	0	160.9	0.781	22	1.5	16.5	26	3.8	16.5
2	3	337.0	0.806	5	3	153.4	0.830	27	1.5	16.5	Dec. 1	3.8	16.5
2	6	330.0	0.854	5	6	146.8	0.877	Apr. 1	1.6	16.5	6	3.7	16.6
2	9	323.7	0.899	5	9	140.8	0.918	6	1.6	16.4	11	3.6	16.6
2	12	317.9	0.937	5	12	135.2	0.953	11	-1.6	16.4	16	+3.5	16.6
2	15	312.6	0.967	5	15	130.0	0.979	16	1.6	16.3	21	3.4	16.7
2	18	307.5	0.988	5	18	125.1	0.994	21	1.6	16.3	26	3.3	16.7
2	21	302.6	0.999	5	21	120.2	1.000	26	-1.6	16.2	31	+3.2	16.7

Position angle of satellite  $p = p^1 + (P - P_0)$ .

Apparent distance of satellite  $s = \frac{F^2(p)}{p}$ .

APPARENT ORBIT OF THE SATELLITE OF NEPTUNE AT DATE OF OPPOSITION,  
JANUARY 23, 1917, AS SEEN IN AN INVERTING TELESCOPE.

South



North

Date.	Position Angle of Apsis.	Apparent Distance at Apsis.
Jan. 23	120.1	16.8
May 3	118.7	16.2
Oct. 14	123.8	16.1
Dec. 33	123.2	16.7

## GREENWICH MEAN TIME OF GREATEST ELONGATION.

East.		West.		East.		West.		East.		West.	
d	h	d	h	d	h	d	h	d	h	d	h
Jan.	2 02	Jan.	4 22.8	Mar.	25 7.8	Mar.	28 6.4	Oct.	11 1.2	Oct.	13 23.7
	7 21.3		10 19.9		31 4.9	Apr.	3 3.4		16 22.2		19 20.7
	13 18.5		16 17.0	Apr.	6 2.0		9 0.5		22 19.2		25 17.7
	19 15.6		22 14.1		11 23.0		14 21.6		28 16.2		31 14.7
	25 12.7		28 11.3		17 20.1		20 18.6	Nov.	3 13.2	Nov.	6 11.7
	31 9.8	Feb.	3 8.4		23 17.1		26 15.7		9 10.3		12 8.8
Feb.	6 6.9		9 5.5		29 14.2	May	2 12.7		15 7.3		18 5.8
	12 4.1		15 2.6	May	5 11.2		8 9.7		21 4.3		24 2.9
	18 1.2		20 23.8		11 8.2		14 6.7		27 1.4		29 23.9
	23 22.3		26 20.9		17 5.2		20 3.7	Dec.	2 22.5	Dec.	5 21.0
Mar.	1 19.4	Mar.	4 18.0		23 2.2		26 0.7		8 19.5		11 18.1
	7 16.5		10 15.1		28 23.2		31 21.7		14 16.6		17 15.1
	13 13.6		16 12.2		Oct. . . . .		Oct. . . . .		20 13.7		23 12.2
	19 10.7		22 9.3	Oct.	5 4.2	Oct.	8 2.7		26 10.8		29 9.3

In the above diagram the central circle represents the planet.  
The sidereal period of the satellite of Neptune is 5<sup>d</sup> 21<sup>h</sup>.044.

## GREENWICH MEAN TIME.

## PLANETARY CONFIGURATIONS.

	d	h	m		d	h	m		
Jan.	1	9	47	$\delta \Upsilon \odot$	..... $\Upsilon - 6$ 58	Mar.	25	18 -	$\odot$ Greatest Hel. Lat. S.
	2	15	-	$\Upsilon$	Greatest elong. E. 19 22		29	5 -	$\delta \odot \odot$ Superior.
	3	0	-	$\oplus$	in Perihelion.		30	20 -	$\delta \odot \odot$ ..... $\odot - 0$ 39
	7	-	-	$\odot$	Tot. ecl. vis. at Wash.		31	4 11	$\delta \odot \odot$ ..... $\odot + 1$ 1
	7	5	-	$\Upsilon$	in $\odot$		31	21 33	$\delta \Psi \odot$ ..... $\Psi + 1$ 15
	8	17	4	$\delta \odot \odot$	..... $\odot + 0$ 58	Apr.	5	5 -	$\Upsilon$ in $\odot$
	9	5	31	$\delta \Psi \odot$	..... $\Psi + 1$ 6		9	19 -	$\Upsilon$ in Perihelion.
	9	9	-	$\Upsilon$	Stationary.		12	12 -	$\Psi$ Stationary.
	11	20	-	$\Upsilon$	in Perihelion.		14	1 -	$\square \odot \odot$
	13	13	-	$\delta \Upsilon \odot$	..... $\Upsilon + 3$ 5		16	7 -	$\delta \Upsilon \Upsilon$ ..... $\Upsilon + 3$ 0
	16	21	-	$\square \Upsilon \odot$			16	11 2	$\delta \odot \odot$ ..... $\odot - 4$ 11
	17	7	-	$\delta \odot \odot$			20	2 -	$\Upsilon$ Greatest Hel. Lat. N.
	18	18	-	$\delta \odot \odot$	Inferior.		20	10 29	$\delta \odot \odot$ ..... $\odot - 6$ 5
	21	3	51	$\delta \odot \odot$	..... $\odot + 1$ 26		21	3 47	$\delta \odot \odot$ ..... $\odot - 6$ 14
	22	-	-	$\odot$	Par. ecl. invis. at Wash.		22	3 54	$\delta \Upsilon \odot$ ..... $\Upsilon - 5$ 22
	22	3	-	$\Upsilon$	Greatest Hel. Lat. N.	22	8 -	$\square \Psi \odot$	
	22	5	28	$\delta \Upsilon \odot$	..... $\Upsilon + 3$ 13	22	16 15	$\delta \Upsilon \odot$ ..... $\Upsilon - 1$ 16	
	23	10	34	$\delta \odot \odot$	..... $\odot - 3$ 13	24	8 -	$\Upsilon$ Greatest elong. E. 20 22	
	23	13	-	$\delta \Psi \odot$		25	20 -	$\delta \odot \odot$ Superior.	
	23	22	39	$\delta \odot \odot$	..... $\odot - 3$ 30	27	14 13	$\delta \odot \odot$ ..... $\odot + 1$ 24	
	26	12	-	$\odot$	Greatest Hel. Lat. S.	May	28	5 35	$\delta \Psi \odot$ ..... $\Psi + 1$ 32
	27	21	-	$\odot$	in $\Upsilon$		5	14 -	$\delta \odot \odot$ ..... $\odot + 0$ 16
	28	20	17	$\delta \Upsilon \odot$	..... $\Upsilon - 6$ 45		5	15 -	$\odot$ Stationary.
	30	4	-	$\Upsilon$	Stationary.		8	23 -	$\delta \Upsilon \odot$
	30	9	-	$\delta \Upsilon \odot$	..... $\Upsilon + 2$ 53		13	6 -	$\delta \Upsilon \odot$ ..... $\Upsilon + 0$ 25
Feb.	2	10	-	$\delta \odot \odot$	..... $\odot - 0$ 26	13	13 -	$\Upsilon$ in $\Upsilon$	
	4	18	46	$\delta \odot \odot$	..... $\odot + 0$ 48	13	17 54	$\delta \odot \odot$ ..... $\odot - 4$ 29	
	5	10	9	$\delta \Psi \odot$	..... $\Psi + 1$ 2	14	14 -	$\square \odot \odot$	
	8	12	-	$\delta \odot \odot$		16	8 -	$\delta \odot \odot$ Inferior.	
	11	21	-	$\Upsilon$	Greatest elong. W. 26 3	19	6 46	$\delta \odot \odot$ ..... $\odot - 5$ 2	
	14	14	-	$\Upsilon$	in $\Upsilon$	19	23 43	$\delta \Upsilon \odot$ ..... $\Upsilon - 4$ 55	
	19	12	49	$\delta \Upsilon \odot$	..... $\Upsilon - 2$ 20	20	4 11	$\delta \Upsilon \odot$ ..... $\Upsilon - 5$ 50	
	20	4	19	$\delta \odot \odot$	..... $\odot - 3$ 25	21	0 -	$\Upsilon$ in $\odot$	
	20	5	-	$\odot$	in Perihelion.	21	2 57	$\delta \odot \odot$ ..... $\odot - 2$ 56	
	20	12	45	$\delta \odot \odot$	..... $\odot - 3$ 38	23	19 -	$\Upsilon$ in Aphelion.	
	21	11	52	$\delta \odot \odot$	..... $\odot - 5$ 10		24	9 -	$\delta \Upsilon \Upsilon$ ..... $\Upsilon - 2$ 6
	24	10	-	$\delta \odot \odot$	..... $\odot - 0$ 23		25	2 55	$\delta \odot \odot$ ..... $\odot + 1$ 49
	24	20	-	$\Upsilon$	in Aphelion.		25	14 43	$\delta \Psi \odot$ ..... $\Psi + 1$ 47
	25	12	6	$\delta \Upsilon \odot$	..... $\Upsilon - 6$ 21		28	14 -	$\Upsilon$ Stationary.
	28	10	-	$\delta \odot \odot$			28	23 -	$\odot$ Stationary.
Mar.	2	2	-	$\delta \odot \odot$	..... $\odot - 1$ 12	June	5	12 -	$\delta \Upsilon \odot$ ..... $\Upsilon - 3$ 50
	3	11	-	$\odot$	in Aphelion.		8	0 -	$\delta \odot \odot$ ..... $\odot + 0$ 41
	3	21	49	$\delta \odot \odot$	..... $\odot + 0$ 47		8	14 -	$\delta \Upsilon \odot$ ..... $\Upsilon - 3$ 3
	4	15	10	$\delta \Psi \odot$	..... $\Psi + 1$ 3		9	23 41	$\delta \odot \odot$ ..... $\odot - 4$ 40
	17	4	-	$\Upsilon$	Greatest Hel. Lat. S.		11	11 -	$\delta \Upsilon \odot$ ..... $\Upsilon - 3$ 31
	18	10	-	$\delta \Upsilon \odot$	..... $\Upsilon - 0$ 43		11	12 -	$\Upsilon$ Greatest elong. W. 23 32
	20	1	24	$\delta \odot \odot$	..... $\odot - 3$ 52		13	4 -	$\Upsilon$ Greatest Hel. Lat. S.
	20	16	38	$\odot$	enters $\Upsilon$ , Spring com.		16	17 51	$\delta \Upsilon \odot$ ..... $\Upsilon - 4$ 30
	22	5	12	$\delta \odot \odot$	..... $\odot - 6$ 40		17	1 51	$\delta \odot \odot$ ..... $\odot - 3$ 23
	22	9	27	$\delta \Upsilon \odot$	..... $\Upsilon - 7$ 13		17	5 40	$\delta \Upsilon \odot$ ..... $\Upsilon - 6$ 1
	22	12	11	$\delta \odot \odot$	..... $\odot - 6$ 12		19	- -	$\odot$ Par. ecl. invis. at Wash.
	23	20	-	$\delta \Upsilon \odot$	..... $\Upsilon - 0$ 56		20	8 34	$\delta \odot \odot$ ..... $\odot + 1$ 25
	25	7	26	$\delta \Upsilon \odot$	..... $\Upsilon - 5$ 51		21	12 14	$\odot$ enters $\odot$ , Summer com.
	25	12	-	$\odot$	Stationary.		21	16 49	$\delta \odot \odot$ ..... $\odot + 2$ 12

GREENWICH MEAN TIME.

### PLANETARY CONFIGURATIONS.

d	h	m			d	h	m		
June 22	0	2	$\delta \Psi \odot$	$\Psi + 1^{\circ} 56'$	Oct. 1	0	-	$\delta \delta h$	$\delta + 0^{\circ} 40'$
22	21	-	$\odot$ in $\Omega$		2	18	-	$\delta \delta$ in Perihelion.	
23	19	-	$\odot$ in Perihelion.		4	4	-	Greatest elong. W.	17 56
July 2	4	-	$\delta$ in $\Omega$		4	21	27	$\delta \mathcal{Z} \odot$	$\mathcal{Z} - 2^{\circ} 57'$
3	8	-	$\oplus$ in Aphelion.		9	8	54	$\delta \Psi \odot$	$\Psi + 2^{\circ} 36'$
4	-	-	$\odot$ Tot. ecl. invis. at Wash.		9	21	25	$\delta h \odot$	$h + 3^{\circ} 52'$
4	12	-	$\delta \odot h$	$\odot + 1^{\circ} 4'$	10	7	36	$\delta \delta \odot$	$\delta + 5^{\circ} 2'$
6	11	-	$\delta \odot \Psi$	$\odot + 1^{\circ} 43'$	13	1	-	Greatest Hel. Lat. N.	
6	18	-	$\odot$ in Perihelion.		14	4	-	$\odot$ in Aphelion.	
7	6	14	$\delta \odot \odot$	$\odot - 4^{\circ} 41'$	14	16	37	$\delta \delta \odot$	$\delta + 7^{\circ} 33'$
12	4	-	$\delta \odot \odot$ Superior.		19	7	57	$\delta \odot \odot$	$\odot - 0^{\circ} 8'$
14	9	53	$\delta \mathcal{Z} \odot$	$\mathcal{Z} - 4^{\circ} 5'$	24	15	32	$\delta \odot \odot$	$\odot - 4^{\circ} 44'$
15	12	-	$\odot$ Greatest Hel. Lat. N.		30	4	-	$\odot$ Stationary.	
15	20	41	$\delta \delta \odot$	$\delta - 1^{\circ} 26'$	30	14	-	$\square \Psi \odot$	
17	1	-	$\odot$ Greatest Hel. Lat. N.		Nov. 1	4	25	$\delta \mathcal{Z} \odot$	$\mathcal{Z} - 2^{\circ} 55'$
18	-	-	$\odot$ Par. ecl. invis. at Wash.		3	6	-	$\delta \odot \odot$ Superior.	
18	9	-	$\delta \odot h$	$\delta + 1^{\circ} 25'$	5	10	-	$\odot$ Greatest Hel. Lat. S.	
18	22	-	$\delta \delta \Psi$	$\delta + 2^{\circ} 3'$	5	12	-	$\delta$ in $\mathfrak{S}$	
19	6	48	$\delta h \odot$	$h + 2^{\circ} 33'$	5	17	16	$\delta \Psi \odot$	$\Psi + 2^{\circ} 53'$
19	8	52	$\delta \Psi \odot$	$\Psi + 2^{\circ} 1'$	6	8	32	$\delta h \odot$	$h + 4^{\circ} 19'$
19	11	9	$\delta \odot \odot$	$\delta + 4^{\circ} 11'$	6	16	-	$\square h \odot$	
20	21	12	$\delta \odot \odot$	$\odot + 5^{\circ} 23'$	8	1	37	$\delta \delta \odot$	$\delta + 6^{\circ} 46'$
27	9	-	$\delta h \odot$		9	13	-	$\Psi$ Stationary.	
27	19	-	$\delta \Psi \odot$		12	8	-	$\square \odot \odot$	
30	1	-	$\delta h \Psi$	$h + 0^{\circ} 39'$	14	20	50	$\delta \delta \odot$	$\delta + 1^{\circ} 48'$
Aug. 3	14	20	$\delta \odot \odot$	$\odot - 4^{\circ} 34'$	15	17	-	$\delta$ in Aphelion.	
9	12	-	$\odot$ in $\mathfrak{S}$		18	2	46	$\delta \odot \odot$	$\odot - 4^{\circ} 4'$
10	23	51	$\delta \mathcal{Z} \odot$	$\mathcal{Z} - 3^{\circ} 39'$	20	21	43	$\delta \odot \odot$	$\odot - 4^{\circ} 56'$
13	16	0	$\delta \delta \odot$	$\delta + 0^{\circ} 42'$	26	4	-	$h$ Stationary.	
14	16	-	$\delta \odot \odot$		28	8	30	$\delta \mathcal{Z} \odot$	$\mathcal{Z} - 3^{\circ} 7'$
15	17	3	$\delta \Psi \odot$	$\Psi + 2^{\circ} 7'$	28	18	-	$\delta \mathcal{Z} \odot$	
15	20	18	$\delta h \odot$	$h + 2^{\circ} 55'$	29	20	-	$\odot$ Greatest elong. E.	47 18
19	18	-	$\odot$ in Aphelion.		3	1	39	$\delta \Psi \odot$	$\Psi + 3^{\circ} 2'$
19	21	21	$\delta \delta \odot$	$\delta + 3^{\circ} 36'$	3	17	42	$\delta h \odot$	$h + 4^{\circ} 36'$
20	7	52	$\delta \odot \odot$	$\odot + 6^{\circ} 33'$	6	2	-	$\delta$ Greatest Hel. Lat. S.	
22	17	-	$\delta$ Greatest elong. E.	27 23	6	15	37	$\delta \odot \odot$	$\odot + 8^{\circ} 0'$
30	23	28	$\delta \odot \odot$	$\odot - 4^{\circ} 30'$	11	16	-	$\square \odot \odot$	
Sept. 2	22	-	$\square \mathcal{Z} \odot$		13	-	-	$\odot$ Ann. ecl. invis. at Wash.	
4	20	-	$\delta$ Stationary.		15	11	42	$\delta \delta \odot$	$\delta - 3^{\circ} 4'$
7	11	47	$\delta \mathcal{Z} \odot$	$\mathcal{Z} - 3^{\circ} 14'$	16	18	-	$\delta$ Greatest elong. E.	20 20
9	3	-	$\delta$ Greatest Hel. Lat. S.		17	13	1	$\delta \odot \odot$	$\odot - 5^{\circ} 30'$
9	14	-	$\odot$ in $\mathfrak{S}$		18	4	47	$\delta \odot \odot$	$\odot - 5^{\circ} 5'$
11	11	53	$\delta \delta \odot$	$\delta + 2^{\circ} 55'$	21	21	46	$\odot$ enters $\mathfrak{S}$ , Winter com.	
12	0	54	$\delta \Psi \odot$	$\Psi + 2^{\circ} 18'$	24	11	-	$\odot$ Stationary.	
12	9	12	$\delta h \odot$	$h + 3^{\circ} 22'$	25	0	-	$\delta$ Greatest Hel. Lat. N.	
16	9	7	$\delta \delta \odot$	$\delta + 1^{\circ} 31'$	25	2	-	$\delta$ in $\Omega$	
18	12	-	$\delta \odot \odot$ Inferior.		25	10	46	$\delta \mathcal{Z} \odot$	$\mathcal{Z} - 3^{\circ} 20'$
19	10	30	$\delta \odot \odot$	$\odot + 4^{\circ} 5'$	27	-	-	$\odot$ Tot. ecl. vis. at Wash.	
21	22	-	$\delta \odot \Psi$	$\delta + 1^{\circ} 18'$	29	17	-	$\odot$ in Perihelion.	
23	3	1	$\odot$ enters $\mathfrak{A}$ , Autumn com.		30	9	13	$\delta \Psi \odot$	$\Psi + 3^{\circ} 0'$
26	20	-	$\delta$ Stationary.		30	20	-	$\delta \odot \odot$	$\odot + 0^{\circ} 35'$
27	8	14	$\delta \odot \odot$	$\odot - 4^{\circ} 33'$	31	0	4	$\delta h \odot$	$h + 4^{\circ} 37'$
28	3	-	$\delta$ in $\Omega$		31	17	-	$\odot$ in $\Omega$	
30	5	-	$\mathcal{Z}$ Stationary.						

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>			<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>
1	Abbadia, France . . .	+43 22 52.2	-11 34.4	69	9.999317	+ 0 7 0.1	+ 1.15
2	Adelaide, S. Australia .	-34 55 38.0 <sup>a</sup>	+10 52.4	41 <sup>b</sup>	9.999526	- 9 14 20.07 <sup>a</sup>	- 91.06
3	Adelaide, S. Australia .	-34 55 37.4 <sup>c</sup>	+10 52.4	...	9.999523	- 9 14 20.17 <sup>c</sup>	- 91.06
4	Albany, N. Y. . . .	+42 39 12.7 <sup>a</sup>	-11 33.1	70 <sup>a</sup>	9.999336	+ 4 55 7.12 <sup>a</sup>	+ 48.48
5	Albany, N. Y. . . .	+42 39 49.5 <sup>a</sup>	-11 33.1	52	9.999335	+ 4 54 59.97 <sup>a</sup>	+ 48.46
6	Algiers, Algeria . . .	+36 47 50	-11 6.7	342	9.999501	- 0 12 8.38	- 1.99
7	Allegheny, Pa. . . .	+40 28 58.1 <sup>d</sup>	-11 26.7	370 <sup>d</sup>	9.999411	+ 5 20 5.39 <sup>d</sup>	+ 52.58
8	Allegheny, Pa. . . .	+40 27 41.6	-11 26.6	...	9.999387	+ 5 20 2.93	+ 52.58
9	Amherst, Mass. . . .	+42 21 56.5 <sup>e</sup>	-11 32.5	110 <sup>e</sup>	9.999346	+ 4 50 5.93 <sup>e</sup>	+ 47.66
10	Amherst, Mass. . . .	+42 22 17.1 <sup>f</sup>	-11 32.5	...	9.999338	+ 4 50 4.67 <sup>f</sup>	+ 47.65
11	Ann Arbor, Mich. . . .	+42 16 48.7 <sup>a</sup>	-11 32.3	282 <sup>a</sup>	9.999360	+ 5 34 55.27 <sup>a</sup>	+ 55.02
12	Appleton, Wis. . . .	+44 15 39.2 <sup>g</sup>	-11 35.4	242	9.999307	+ 5 53 35.92 <sup>g</sup>	+ 58.09
13	Arceetri, Italy . . . .	+43 45 14.4	-11 34.9	184	9.999316	- 0 45 1.30	- 7.40
14	Arequipa, Peru . . . .	-16 22 28.0 <sup>h</sup>	+ 6 15.2	2451 <sup>h</sup>	0.000052	+ 4 46 11.73 <sup>h</sup>	+ 47.02
15	Armagh, Ireland . . .	+54 21 12.7 <sup>c</sup>	-10 59.6	61 <sup>c</sup>	9.999040	+ 0 26 35.4 <sup>c</sup>	+ 4.37
16	Athens, Greece . . . .	+37 58 19.7 <sup>i</sup>	-11 14.3	107 <sup>i</sup>	9.999456	- 1 34 53 <sup>i</sup>	- 15.59
17	Baltimore, Md. . . .	+39 17 52.0 <sup>j</sup>	-11 21.5	36 <sup>j</sup>	9.999418	+ 5 6 29.1 <sup>j</sup>	+ 50.35
18	Bamberg, Bavaria . . .	+49 53 6.0 <sup>c</sup>	-11 26.0	299 <sup>c</sup>	9.999167	- 0 43 33.57 <sup>c</sup>	- 7.16
19	Barcelona, Spain . . .	+41 25 18	-11 30.0	420	9.999391	- 0 8 28.0	- 1.39
20	Beloit, Wis. . . . .	+42 30 8.4	-11 32.8	...	9.999335	+ 5 56 7.4	+ 58.50
21	Bergedorf, Germany . .	+53 28 46.2	-11 6.1	35	9.999060	- 0 40 57.74	- 6.73
22	Berkeley, Cal. . . . .	+37 52 23.6	-11 13.7	97	9.999458	+ 8 9 2.72	+ 80.34
23	Berlin, Prussia . . . .	+52 30 16.7 <sup>k</sup>	-11 12.5	47 <sup>k</sup>	9.999085	- 0 53 34.80 <sup>k</sup>	- 8.80
24	Berlin, Prussia . . . .	+52 31 13.1	-11 12.4	...	9.999081	- 0 53 34.41	- 8.80
25	Berlin, Prussia . . . .	+52 31 30.7	-11 12.4	...	9.999081	- 0 53 27.40	- 8.78
26	Berlin, Prussia . . . .	+52 29 7	-11 12.6	38	9.999084	- 0 53 54.2	- 8.86
27	Berne, Switzerland . .	+46 57 8.7	-11 34.2	573	9.999260	- 0 29 45.70 <sup>a</sup>	- 4.89
28	Besançon, France . . .	+47 14 59.0	-11 33.7	312	9.999235	- 0 23 57.13	- 3.93
29	Birr Castle, Ireland . .	+53 5 47	-11 8.7	56	9.999071	+ 0 31 40.9	+ 5.20
30	Bloomington, Ind. . . .	+39 9 56 <sup>d</sup>	-11 20.8	238 <sup>d</sup>	9.999435	+ 5 46 5 <sup>d</sup>	+ 56.85
31	Bogota, Colombia . . .	+ 4 35 55.2 <sup>c</sup>	- 1 50.8	2634	0.000170	+ 4 56 23.5	+ 48.69
32	Bombay (Colaba), India	+18 53 36.2 <sup>c</sup>	- 7 5.1	14 <sup>c</sup>	9.999849	- 4 51 15.72 <sup>c</sup>	- 47.85
33	Bonn, Prussia . . . .	+50 43 45.0 <sup>k</sup>	-11 22.3	62 <sup>l</sup>	9.999130	- 0 28 23.17 <sup>k</sup>	- 4.66
34	Bordeaux (Floirac), France	+44 50 7.2 <sup>a</sup>	-11 35.6	73	9.999281	+ 0 2 5.51 <sup>a</sup>	+ 0.34
35	Boston, Mass. . . . .	+42 20 58 <sup>m</sup>	-11 32.5	31 <sup>m</sup>	9.999341	+ 4 44 19.1 <sup>m</sup>	+ 46.71
36	Boston, Mass. . . . .	+42 21 32.5	-11 32.5	48	9.999342	+ 4 44 15.0	+ 46.70
37	Bothkamp, Prussia . . .	+54 12 9.6 <sup>n</sup>	-11 0.8	32 <sup>n</sup>	9.999042	- 0 40 31.02 <sup>n</sup>	- 6.66
38	Bremen, Germany . . .	+53 4 36	-11 8.8	...	9.999067	- 0 35 15	- 5.79
39	Breslau, Prussia . . . .	+51 6 55.8 <sup>k</sup>	-11 20.4	147 <sup>k</sup>	9.999126	- 1 8 8.72 <sup>k</sup>	- 11.20
40	Brisbane, Queensland .	-27 28 0.0	+ 9 28.3	...	9.999691	-10 12 6.17	-100.55
41	Brussels (Uccle), Belgium	+50 47 55.5 <sup>a</sup>	-11 21.9	105 <sup>a</sup>	9.999131	- 0 17 28.05 <sup>a</sup>	- 2.86
42	Brussels, Belgium . . .	+50 51 10.6 <sup>c</sup>	-11 21.7	...	9.999123	- 0 17 28.02 <sup>c</sup>	- 2.87
43	Budapest, Hungary . . .	+47 29 34.7 <sup>c</sup>	-11 33.2	131 <sup>c</sup>	9.999217	- 1 16 15.3 <sup>c</sup>	- 12.53
44	Cambridge, England . .	+52 12 51.6	-11 14.3	28	9.999091	- 0 0 22.75	- 0.06
45	Cambridge, Mass. . . .	+42 22 47.6 <sup>o</sup>	-11 32.6	24	9.999340	+ 4 44 31.05 <sup>o</sup>	+ 46.74
46	Cape of Good Hope . . .	-33 56 3.5 <sup>p</sup>	+10 43.6	13 <sup>p</sup>	9.999548	- 1 13 54.76 <sup>p</sup>	- 12.14
47	Carloforte, Sardinia . .	+39 8 8.9 <sup>q</sup>	-11 20.7	18 <sup>q</sup>	9.999421	- 0 33 14.9 <sup>q</sup>	- 5.46
48	Catania, Sicily . . . .	+37 30 13.2 <sup>c</sup>	-11 11.4	49 <sup>c</sup>	9.999464	- 1 0 20.70 <sup>c</sup>	- 9.91
49	Charkow, Russia . . . .	+50 0 9.9 <sup>a</sup>	-11 25.5	138 <sup>r</sup>	9.999153	- 2 24 55.75 <sup>a</sup>	- 23.81
50	Charlottesville, Va. . .	+38 2 1.2 <sup>c</sup>	-11 14.6	259 <sup>c</sup>	9.999465	+ 5 14 5.33 <sup>c</sup>	+ 51.60

<sup>a</sup> Meridian circle.<sup>b</sup> Standard barometer.<sup>c</sup> Transit instrument.<sup>d</sup> Transit instrument pier.<sup>e</sup> Center of large dome.<sup>f</sup> Center of dome tower.<sup>g</sup> Center of dome.<sup>h</sup> Transit pier.<sup>i</sup> Cercle Syngros.<sup>j</sup> Center of instrument house.<sup>k</sup> Center of observatory.<sup>l</sup> Floor of meridian room.<sup>m</sup> Foot of pillar of 7-in. equatorial.<sup>n</sup> Cube of equatorial.<sup>o</sup> Dome of 15-in. equatorial.<sup>p</sup> 8-in. meridian circle.<sup>q</sup> Zenith telescope.<sup>r</sup> Barometer in meridian room.

No.	Authority for—		Description.
	Latitude.	Longitude.	
1	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Obs. Paris Acad. of Sci., Hendaye.
2	Letter from Govt. Astronomer, 1913.	Letter from Govt. Astronomer, 1913.	Govt. Obs., since 1884.
3	Letter from Govt. Astronomer, 1913.	Letter from Govt. Astronomer, 1913.	Govt. Obs., before 1884.
4	Letter from Director, 1913.	Letter from Director, 1913.	Dudley Obs., since 1893.
5	Letter from Director, 1913.	Letter from Director, 1913.	Dudley Obs., before 1893.
6	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	At Bouzaréah. Old Obs. 3'.8 S., 8° E.
7	<i>Publications of Obs.</i> , 1909.	<i>Publications of Obs.</i> , 1909.	• Obs. Western Univ. of Pa., since 1905.
8	Letter from Director, 1897.	Letter from Director, 1897.	Obs. Western Univ. of Pa., before 1905.
9	Letter from Director, 1913.	Letter from Director, 1913.	Amherst College Obs., since 1903.
10	Letter from Director, 1913.	Letter from Director, 1913.	Lawrence Obs., before 1903.
11	Letter from Director, 1913.	Letter from Director, 1913.	Detroit Obs., Univ. of Mich.
12	See footnote (b).	See footnote (b).	Underwood Obs., Lawrence College.
13	<i>Pubbl. dell'Osserv.</i> , 1900.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Observatory.
14	<i>Harvard Annals</i> , 1903.	<i>Harvard Annals</i> , 1903.	Branch of Harvard Coll. Obs.
15	<i>Armagh Catalogue of Stars</i> , 1840.	<i>Armagh Catalogue of Stars</i> , 1840.	Armagh Observatory.
16	<i>Annales de l'Obs.</i> , 1910.	Letter from Director, 1913.	• National Observatory.
17	Letter from Director, 1913.	Letter from Director, 1913.	Johns Hopkins Univ. Obs.
18	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Remeis Observatory.
19	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Fabra Obs., Acad. of Sci. and Arts.
20	Letter from Director, 1897.	Letter from Director, 1897.	Smith Obs., Beloit College.
21	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Hamburg Obs., since 1909.
22	Letter from Director, 1897.	Letter from Director, 1897.	Students' Obs., Univ. of Cal.
23	<i>Astron. Nach.</i> , Nr. 3545, 1898.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Obs., since 1835.
24	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs., before 1835.
25	<i>Astron. Nach.</i> , Nr. 3170, 1893.	<i>Astron. Nach.</i> , Nr. 3170, 1893.	Urania Observatory.
26	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Treptow Observatory.
27	<i>Berliner Jahrbuch</i> .	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Observatory, Cantonal Univ.
28	<i>Astron. Nach.</i> , Nr. 2805, 1887.	<i>Astron. Nach.</i> , Nr. 2805, 1887.	National Observatory.
29	<i>British Nautical Almanac</i> .	<i>British Nautical Almanac</i> .	Private Obs. of Earl of Rosse.
30	Letter from Director, 1913.	Letter from Director, 1913.	Kirkwood Obs., Univ. of Ind.
31	Letter from Director, 1913.	Letter from Director, 1913.	National Observatory.
32	Letter from Director, 1913.	Letter from Director, 1913.	Government Observatory.
33	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Observatory.
34	Letter from Director, 1897.	<i>Annales de l'Obs.</i> , 1885.	Obs., Univ. of Bordeaux.
35	Letter from Director, 1909.	Letter from Director, 1909.	Boston Univ. Obs., since 1908.
36	Letter from Director, 1895.	Letter from Director, 1895.	Boston Univ. Obs., before 1908.
37	<i>Beob. zu Bothkamp</i> , 1872.	Letter from Director, 1913.	Obs. of Herr von Bülow.
38	<i>Astron. Nach.</i> , Nr. 15, 1822.	<i>Astron. Nach.</i> , Nr. 15, 1822.	Formerly Olber's Obs.
39	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
40	<i>British Nautical Almanac</i> .	• <i>British Nautical Almanac</i> .	Brisbane Observatory.
41	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs., since 1891.
42	<i>Annales de l'Obs.</i> , 1857.	Letter from Director, 1913.	Royal Obs., before 1891.
43	<i>Astron. Nach.</i> , Nr. 2752, 1886.	<i>Astron. Nach.</i> , Nr. 2752, 1886.	University Observatory.
44	Letter from Director, 1879.	Letter from Director, 1879.	University Observatory.
45	<i>Harvard Annals</i> , 1887.	<i>U. S. C. and G. S. Report</i> , 1897.	Harvard College Obs.
46	<i>Cape Gen. Catalogue of Stars</i> , 1885.	<i>Monthly Notices, R. A. S.</i> , Nov. 1908.	Royal Observatory.
47	See footnote (d).	Letter from Director, 1913.	International Lat. Obs.
48	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs. of Catania and Etna.
49	<i>Annales de l'Obs.</i> , 1904.	<i>Annales de l'Obs.</i> , 1904.	University Observatory.
50	Letter from Director, 1913.	Letter from Director, 1913.	Leander McCormick Obs., Univ. Va.

• Name of Western Univ. of Pa. changed in 1908; now the Univ. of Pittsburgh.

• *Professional Papers, Corps of Engineers, U. S. A.* 1882.

• Old meridian circle 0°.4 S., 0°.1 W. of Cercle Synagron.

• *Revue des Internationales Breitenindicates*, 1900-1908.

• With the new value of the longitude of Sydney.

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log <i>p</i> (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		° ' "	° ' "			h m s	s
51	Chicago, Ill. . . . .	+41 50 1.0	-11 31.2	...	9.999352	+5 50 26.84	+57.57
52	Christiania, Norway . .	+59 54 44.0 <i>a</i>	-10 4.6	25 <i>a</i>	9.998908	-0 42 53.50 <i>a</i>	- 7.05
53	Cincinnati, Ohio . . .	+39 8 19.8 <i>b</i>	-11 20.7	247 <i>b</i>	9.999437	+5 37 41.40 <i>b</i>	+55.48
54	Cincinnati, Ohio . . .	+39 6 26.5	-11 20.5	...	9.999421	+5 37 59.00	+55.52
55	Cleveland, Ohio . . .	+41 30 14.5 <i>c</i>	-11 30.2	215 <i>c</i>	9.999375	+5 26 25.86 <i>c</i>	+53.62
56	Clinton, N. Y. . . . .	+43 3 17.0	-11 33.9	276	9.999340	+5 1 37.45	+49.55
57	Coimbra, Portugal . . .	+40 12 24.5	-11 25.6	99	9.999400	+0 33 43.1	+ 5.54
58	Columbia, Mo. . . . .	+38 56 51.7 <i>d</i>	-11 19.7	225 <i>e</i>	9.999440	+6 9 18.33 <i>d</i>	+60.67
59	Columbus, Ohio . . . .	+39 59 50.4 <i>d</i>	-11 24.7	233 <i>d</i>	9.999414	+5 32 2.60 <i>d</i>	+54.55
60	Copenhagen, Denmark .	+55 41 12.6	-10 48.6	14	9.999005	-0 50 18.69 <i>f</i>	- 8.26
61	Cordova, Arg. Rep. . . .	-31 25 15.5 <i>g</i>	+10 18.0	434 <i>g</i>	9.999634	+4 16 48.22 <i>g</i>	+42.19
62	Cracow, Austria . . . .	+50 3 52.0 <i>a</i>	-11 25.2	221 <i>a</i>	9.999157	-1 19 50.27 <i>a</i>	-13.12
63	Danzig, Prussia . . . .	+54 21 18.0	-10 59.6	3	9.999036	-1 14 39.6	-12.26
64	Dehra Dun, India . . .	+30 18 51.8 <i>h</i>	-10 5.3	681 <i>h</i>	9.999676	-5 12 11.76 <i>h</i>	-51.29
65	Denver, Colo. . . . .	+39 40 36.4 <i>a</i>	-11 23.3	1644 <i>i</i>	9.999518	+6 59 47.72 <i>a</i>	+68.96
66	Des Moines, Iowa . . .	+41 36 0	-11 30.5	296	9.999378	+6 14 30.56	+61.52
67	Dorpat (Jurjew), Russia	+58 22 47.2 <i>a</i>	-10 22.1	67 <i>a</i>	9.998945	-1 46 53.22 <i>a</i>	-17.56
68	Dresden, Saxony . . . .	+51 2 16.8	-11 20.8	121	9.999126	-0 54 54.74	- 9.02
69	Dublin, Ireland . . . .	+53 23 13.1 <i>a</i>	-11 6.7	86 <i>a</i>	9.999066	+0 25 21.1 <i>a</i>	+ 4.16
70	Dun Echt, Scotland . .	+57 9 36	-10 34.8	141	9.998979	+0 9 40.0	+ 1.59
71	Durham, England . . . .	+54 46 6.2 <i>j</i>	-10 56.4	107 <i>k</i>	9.999033	+0 6 19.75 <i>j</i>	+ 1.04
72	Dusseldorf, Prussia . .	+51 12 25.0 <i>l</i>	-11 19.9	46 <i>l</i>	9.999117	-0 27 2.69 <i>l</i>	- 4.44
73	Edinburgh, Scotland . .	+55 55 30.0 <i>a</i>	-10 46.5	134 <i>m</i>	9.999007	+0 12 44.22 <i>a</i>	+ 2.09
74	Edinburgh, Scotland . .	+55 57 23.2 <i>n</i>	-10 46.2	106 <i>o</i>	9.998995	+0 12 43.05 <i>n</i>	+ 2.09
75	Elmira, N. Y. . . . .	+42 6 25	-11 31.9	...	9.999345	+5 7 13.90	+50.47
76	Evanston, Ill. . . . .	+42 3 33.4	-11 31.8	175	9.999358	+5 50 42.3	+57.61
77	Flagstaff, Ariz. . . . .	+35 12 30.5	-10 54.7	2210	9.999667	+7 26 44.58	+73.39
78	Gaithersburg, Md. . . .	+39 8 13.2 <i>r</i>	-11 20.7	165	9.999431	+5 8 47.73	+50.73
79	Geneva, N. Y. . . . .	+42 52 46.2	-11 33.6	152	9.999336	+5 8 1.00	+50.60
80	Geneva, Switzerland . .	+46 11 59.3 <i>a</i>	-11 35.2	407 <i>a</i>	9.999268	-0 24 36.61 <i>a</i>	- 4.04
81	Genoa, Italy . . . . .	+44 25 9.3 <i>a</i>	-11 35.5	105	9.999223	-0 35 41.28 <i>a</i>	- 5.86
82	Georgetown, D. C. . . .	+38 54 26.7 <i>b</i>	-11 19.5	47	9.999429	+5 8 18.26 <i>b</i>	+50.65
83	Glasgow, Mo. . . . .	+39 13 45.6	-11 21.1	227	9.999433	+6 11 18.08	+61.09
84	Glasgow, Scotland . . .	+55 52 42.8 <i>a</i>	-10 46.9	55 <i>p</i>	9.999003	+0 17 10.55 <i>a</i>	+ 2.82
85	Gotha, Germany . . . .	+50 56 37.9 <i>l</i>	-11 21.2	322 <i>a</i>	9.999142	-0 42 50.51 <i>l</i>	- 7.04
86	Gotha, Germany . . . .	+50 56 4.4 <i>j</i>	-11 21.2	360 <i>j</i>	9.999145	-0 42 55.00 <i>j</i>	- 7.05
87	Göttingen, Prussia . . .	+51 31 48.1 <i>q</i>	-11 18.2	161 <i>q</i>	9.999116	-0 39 46.22 <i>q</i>	- 6.53
88	Greencastle, Ind. . . . .	+39 38 46.6 <i>a</i>	-11 23.1	262 <i>a</i>	9.999425	+5 47 24.36 <i>a</i>	+57.07
89	Greenwich, England . .	+51 28 38.2 <i>a</i>	-11 18.5	49 <i>a</i>	9.999110	0 0 0.00 <i>a</i>	0.00
90	Hamburg, Germany . . .	+53 33 6.0	-11 5.6	25	9.999057	-0 39 53.60 <i>a</i>	- 6.55
91	Hamburg, Germany . . .	+53 32 51.3 <i>d</i>	-11 5.6	30 <i>d</i>	9.999058	-0 39 53.46 <i>d</i>	- 6.55
92	Hanover, N. H. . . . .	+43 42 15.3	-11 34.8	183	9.999317	+4 49 8.02	+47.50
93	Haverford, Pa. . . . .	+40 0 40.1 <i>r</i>	-11 24.8	...	9.999398	+5 1 12.70 <i>r</i>	+49.48
94	Heidelberg, Baden . . .	+49 23 55.2 <i>s</i>	-11 27.8	567 <i>s</i>	9.999198	-0 34 53.13 <i>s</i>	- 5.73
95	Heidelberg, Baden . . .	+49 23 55.7 <i>t</i>	-11 27.8	570 <i>t</i>	9.999198	-0 34 52.96 <i>t</i>	- 5.73
96	Heidelberg, Baden . . .	+49 24 34.3 <i>l</i>	-11 27.8	126 <i>l</i>	9.999168	-0 34 46.80 <i>l</i>	- 5.71
97	Helsingfors, Finland . .	+60 9 42.3 <i>a</i>	-10 1.5	33 <i>a</i>	9.998903	-1 39 49.10 <i>a</i>	-16.40
98	Herény, Hungary . . . .	+47 15 47.4	-11 33.7	229	9.999229	-1 6 24.7	-10.91
99	Hong Kong, China . . .	+22 18 13.2 <i>j</i>	- 8 7.4	33 <i>j</i>	9.999793	-7 36 41.86 <i>j</i>	-75.01
100	Iowa City, Iowa . . . .	+41 40 0	-11 30.7	183	9.999369	+6 6 6	+60.14

*a* Meridian circle.*b* Center of dome.*c* Zenith telescope pier.*d* Transit pier.*e* Observatory bench mark.*f* Center of observatory.*g* Old meridian circle.*h* Floor-level of zenith sector pillar.*i* Main floor.*j* Transit instrument.*k* Barometer in transit room.*l* Equatorial.*m* Standard barometer.*n* Point midway between transit instrument and mural circle.*o* Floor of main building.*p* Floor of meridian circle room.*q* Position of meridian circle before 1885.*r* Zenith telescope.*s* Repsold meridian circle.*t* Bruce telescope.

No.	Authority for—		Description.
	Latitude.	Longitude.	
51	U. S. Lake Survey, 1864.	Smithsonian Report, 1886.	<sup>a</sup> Dearborn Observatory.
52	<i>Astron. Nach.</i> , Nr. 3193, 1893.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
53	<i>Publications of the Obs.</i> , 1908.	<i>Astronomical Journal</i> , 1897.	Cincinnati Obs., since 1873.
54	Letter from Director, 1897.	<i>Astronomical Journal</i> , 1854.	Cincinnati Obs. before 1873.
55	Letter from Director, 1913.	Letter from Director, 1913.	Case Obs., Case School of Appl'd Sci.
56	<i>Astron. Nach.</i> , Nr. 2553, 1883.	<i>Astron. Nach.</i> , Nr. 2553, 1883.	Litchfield Obs., Hamilton College.
57	<i>Eph. Astron. de Coimbra</i> , 1889.	<i>Eph. Astron. de Coimbra</i> , 1889.	University Observatory.
58	<i>Trans. Acad. of Sci. of St. Louis</i> , 1894.	<i>Trans. Acad. of Sci. of St. Louis</i> , 1894.	Laws Obs., Univ. of Mo.
59	Letter from Director, 1913.	Letter from Director, 1899.	McMillin Obs., State Univ.
60	<i>British Nautical Almanac</i> .	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
61	<i>Resultados del Obs.</i> , 1887.	<i>Resultados del Obs.</i> , 1887.	National Observatory.
62	Letter from Director, 1913.	Letter from Director, 1913.	Imperial and Royal Obs.
63	Letter from Director, 1897.	Letter from Director, 1897.	Obs. of the School of Navigation.
64	<i>Great Trig. Survey of India</i> , 1906.	Letter from Supt. of Survey, 1913.	Haig Obs., Trig. Survey of India.
65	Letter from Director, 1913.	Letter from Director, 1913.	Chamberlin Obs., Univ. of Denver.
66	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Drake Univ. Obs.
67	<i>Publikationen der Sterne.</i> , 1911.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial University Obs.
68	<i>Berliner Jahrbuch</i> .	<i>Berliner Jahrbuch</i> .	<sup>b</sup> Baron Engelhardt's Obs.
69	<i>Trans. Royal Dublin Soc.</i> , 1899.	<i>Trans. Royal Irish Acad.</i> , 1838.	Dunstun Obs., Trinity College.
70	Letter from Royal Astronomer, 1897.	Letter from Royal Astronomer, 1897.	<sup>c</sup> Lord Crawford's Obs.
71	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
72	<i>Astron. Nach.</i> , Nr. 643, 1848.	Letter from Director, 1913.	Municipal Obs., Bilk.
73	<i>Monthly Notices, R. A. S.</i> , 1907.	Letter from Director, 1913.	Royal Obs. since 1895; Blackford Hill.
74	<i>Monthly Notices, R. A. S.</i> , 1886.	<i>Edinburgh Observations</i> , 1858.	<sup>d</sup> Royal Obs. before 1895; Calton Hill.
75	Letter from Director, 1912.	Letter from Director, 1912.	Elmira College Obs.
76	Letter from Director, 1893.	Letter from Director, 1893.	Dearborn Obs., North Western Univ.
77	<i>British Nautical Almanac</i> .	<i>British Nautical Almanac</i> .	Lowell Observatory.
78	See footnote (j).	See footnote (k).	International Lat. Obs.
79	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Smith Observatory.
80	<i>Mémoire par J. Pidoux</i> , 1900.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Municipal Observatory.
81	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Hydrographic Institute.
82	See footnote (e).	See footnote (e).	Georgetown College Obs.
83	<i>Astron. Nach.</i> , Nr. 2625, 1884.	<i>Washington Observations</i> , 1877.	Morrison Observatory.
84	<i>First Glasgow Catalogue</i> , 1870.	<i>Monthly Notices, R. A. S.</i> , 1865.	University Observatory.
85	Letter from Director, 1913.	Letter from Director, 1913.	Ducal Obs. since 1857.
86	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Ducal Obs. before 1857.
87	<i>Astron. Nach.</i> , Nr. 4428, 1910.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
88	Letter from Director, 1912.	Letter from Director, 1912.	McKim Obs., De Pauw Univ.
89	<i>Greenwich Observations</i> , 1910.	<i>Greenwich Observations</i> , 1910.	/ Royal Observatory.
90	Letter, Director new Obs., 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>e</sup> Hamburg Observatory before 1909.
91	Letter from Director, 1913.	Letter from Director, 1913.	<sup>f</sup> Imperial Marine Obs.
92	Letter from Director, 1894.	Letter from Director, 1894.	Shattuck Obs., Dartmouth College.
93	<i>Proc. Amer. Ph. Soc.</i> , 1883.	<i>Proc. Amer. Ph. Soc.</i> , 1883.	Haverford College Obs.
94	Letter from Director, 1913.	Letter from Director, 1913.	Astron. Institute, Königstuhl Obs.
95	<i>Publik. des Obs., Königstuhl</i> , 1902.	<i>Publik. des Obs., Königstuhl</i> , 1902.	Astrophys. Inst., Königstuhl Obs.
96	<i>Publik. des Obs., Königstuhl</i> , 1902.	<i>Publik. des Obs., Königstuhl</i> , 1902.	<sup>g</sup> Dr. Wolf's Obs. before 1898.
97	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
98	<i>Astron. Nach.</i> , Nr. 2633, 1884.	<i>British Nautical Almanac</i> .	Astrophysical Observatory.
99	<i>Hong Kong Observations</i> , 1897.	Letter from Director, 1897.	Colonial Observatory.
100	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Obs., Univ. of Iowa.

<sup>a</sup> Transferred to Evanston, Ill. in 1887.<sup>b</sup> Instruments transferred to Univ. of Kasan in 1897.<sup>c</sup> Instruments transferred to Royal Obs. at Edinburgh in 1896.<sup>d</sup> City Obs. since 1896.<sup>e</sup> Based upon data from the U. S. C. and G. Survey.<sup>f</sup> Point of reference before 1851, 7½ ft. N., 19 ft. W.<sup>g</sup> At Bergedorf since 1909.<sup>h</sup> Transit instrument before 1908, 0° 5' N., 0° 04' W.<sup>i</sup> Instruments transferred to the Astrophysical Institute of the Königstuhl Obs. in 1898.<sup>j</sup> *Resultate des Internationalen Breitendienstes*, 1900-1908.<sup>k</sup> *Resultate des Internationalen Breitendienstes*, Band I, 1903.



No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		' " "	' " "			h m s	s
101	Ithaca, N. Y. . . . .	+42 26 47.3 <i>a</i>	-11 32.6	256 <i>a</i>	9.999354	+5 5 55.99 <i>a</i>	+50.26
102	Ithaca, N. Y. . . . .	+42 26 51.4	-11 32.6		9.999337	+5 5 56.47	+50.26
103	Jamaica, West Indies . .	+18 24 51 <i>b</i>	-6 55.9	540 <i>b</i>	9.999892	+5 11 29.48 <i>b</i>	+51.17
104	Jena, Saxe-Weimar . . .	+50 55 34.9 <i>c</i>	-11 21.3	165 <i>c</i>	9.999132	-0 46 20.22 <i>c</i>	-7.61
105	Jena, Saxe-Weimar . . .	+50 55 35.8	-11 21.3	155	9.999131	-0 46 20.31	-7.61
106	Jena, Saxe-Weimar . . .	+50 56 11.0	-11 21.3	174	9.999132	-0 46 20.73	-7.61
107	Johannesburg, Transvaal	-28 10 54.6 <i>d</i>	+9 9.8	1804 <i>d</i>	9.999840	-1 52 18.0 <i>d</i>	-18.45
108	Kalocsa, Hungary . . .	+46 31 41.7 <i>b</i>	-11 34.8	117 <i>e</i>	9.999240	-1 15 54.12 <i>b</i>	-12.47
109	Kasan, Russia . . . . .	+55 50 20.0 <i>f</i>	-10 47.3	98 <i>f</i>	9.999007	-3 15 15.61 <i>f</i>	-32.08
110	Kasan, Russia . . . . .	+55 47 23.9 <i>g</i>	-10 47.7	79 <i>g</i>	9.999007	-3 16 29.00 <i>g</i>	-32.28
111	Kew, England . . . . .	+51 28 6	-11 18.5	10	9.999108	+0 1 15.1	+0.21
112	Kief, Russia . . . . .	+50 27 10.0 <i>w</i>	-11 23.5	179 <i>f</i>	9.999145	-2 2 0.56 <i>f</i>	-20.04
113	Kiel, Prussia . . . . .	+54 20 27.6 <i>f</i>	-10 59.7	52 <i>f</i>	9.999040	-0 40 35.45 <i>f</i>	-6.67
114	Kis-Kartal, Hungary . .	+47 41 54.8	-11 32.8		9.993202	-1 18 11.7	-12.85
115	Königsberg, Prussia . .	+54 42 50.5 <i>f</i>	-10 56.8	24 <i>f</i>	9.999029	-1 21 58.97 <i>f</i>	-13.47
116	Kremsmunster, Austria	+48 3 23.1 <i>f</i>	-11 32.0	384 <i>f</i>	9.999220	-0 56 31.58 <i>f</i>	-9.29
117	La Plata, Arg. Rep. . .	-34 54 31.8 <i>h</i>	+10 52.2	18 <i>h</i>	9.999525	+3 51 44.8 <i>h</i>	+38.07
118	Leiden, Netherlands . .	+52 9 19.8 <i>f</i>	-11 14.6	6 <i>f</i>	9.999090	-0 17 56.15 <i>f</i>	-2.95
119	Leipzig, Saxony . . . .	+51 20 5.9 <i>i</i>	-11 19.2	119 <i>i</i>	9.999118	-0 49 33.92 <i>i</i>	-8.14
120	Leipzig, Saxony . . . .	+51 20 20.1	-11 19.2		9.999110	-0 49 29.92	-8.13
121	Liege, Belgium . . . . .	+50 37 6	-11 22.8	127	9.999137	-0 22 15.44	-3.66
122	Lisbon (Tapada), Portugal	+38 42 30.5 <i>j</i>	-11 18.5	95 <i>j</i>	9.999437	+0 36 44.68 <i>j</i>	+6.04
123	Liverpool, England . . .	+53 24 4.8	-11 6.6	61	9.999064	+0 12 17.33	+2.02
124	Liverpool, England . . .	+53 24 47.8	-11 6.5		9.999059	+0 12 0.11	+1.97
125	Lund, Sweden . . . . .	+55 41 51.6 <i>i</i>	-10 48.5	38	9.999006	-0 52 44.97 <i>i</i>	-8.67
126	Lund, Sweden . . . . .	+55 52 12.0	-10 47.0		9.999000	-0 52 47.50	-8.67
127	Lussinpiccolo, Austria .	+44 32 11.0	-11 35.5	42	9.999286	-0 57 52.41	-9.51
128	Lyons, France . . . . .	+45 41 41.0	-11 35.5	299	9.999274	-0 19 8.52 <i>k</i>	-3.14
129	Madison, Wis. . . . .	+43 4 36.8 <i>f</i>	-11 33.9	292 <i>l</i>	9.999340	+5 57 37.90 <i>f</i>	+58.75
130	Madras, India . . . . .	+13 4 8.0 <i>f</i>	-5 5.5	7	9.999926	-5 20 59.14	-52.73
131	Madrid, Spain . . . . .	+40 24 30.0 <i>m</i>	-11 26.4	655 <i>m</i>	9.999433	+0 14 45.09 <i>m</i>	+2.42
132	Manila, P. I. . . . .	+14 34 41	-5 38.2	3	9.999908	-8 3 54.2	-79.48
133	Mare Island, Cal. . . .	+38 5 55.8 <i>n</i>	-11 15.0	18 <i>n</i>	9.999447	+8 9 5.63 <i>n</i>	+80.35
134	Markree, Ireland . . . .	+54 10 31.8	-11 1.0	45	9.999044	+0 33 48.4	+5.55
135	Marseilles, France . . .	+43 18 19 <i>f</i>	-11 34.3	75 <i>o</i>	9.999320	-0 21 34.55 <i>f</i>	-3.54
136	Marseilles, France . . .	+43 17 52	-11 34.3	27	9.999317	-0 21 28.1	-3.53
137	Mauritius (Port Louis) .	-20 5 39	+7 27.7	54	9.999832	-3 50 12.6	-37.82
138	Melbourne, Victoria . .	-37 49 53.2 <i>p</i>	+11 13.4	28 <i>q</i>	9.999454	-9 39 53.92 <i>p</i>	-95.26
139	Meudon, France . . . .	+48 48 18	-11 29.8	162	9.999185	-0 8 55.6	-1.47
140	Middletown, Conn. . . .	+41 33 16.0	-11 30.4		9.999359	+4 50 37.18	+47.74
141	Milan, Italy . . . . .	+45 27 59.3	-11 35.6	120	9.999268	-0 36 45.88 <i>g</i>	-6.04
142	Minneapolis, Minn. . . .	+44 58 40.0 <i>r</i>	-11 35.7	260 <i>r</i>	9.999290	+6 12 56.84 <i>r</i>	+61.27
143	Mizusawa, Japan . . . .	+39 8 3.6 <i>x</i>	-11 20.7	62	9.999424	-9 24 30.75	-92.74
144	Modena, Italy . . . . .	+44 38 51.4	-11 35.6	64	9.999285	-0 43 43.40	-7.18
145	Montreal, Canada . . . .	+45 30 20 <i>s</i>	-11 35.6	57 <i>s</i>	9.999262	+4 54 18.63 <i>s</i>	+48.35
146	Moscow (Presnia), Russia	+55 45 19.5	-10 48.0	150 <i>f</i>	9.999012	-2 30 17.03 <i>f</i>	-24.69
147	Mount Hamilton, Cal. . .	+37 20 25.6 <i>r</i>	-11 10.4	1284 <i>r</i>	9.999552	+8 6 34.89 <i>r</i>	+79.93
148	Mount Wilson, Cal. . . .	+34 12 59.5 <i>t</i>	-10 46.2	1799 <i>t</i>	9.999663	+7 52 14.33 <i>t</i>	+77.58
149	Mount Wilson, Cal. . . .	+34 12 55	-10 46.1	1727 <i>u</i>	9.999658	+7 52 14.3	+77.58
150	Munich, Bavaria . . . .	+48 8 45.5 <i>v</i>	-11 31.7	529 <i>v</i>	9.999227	-0 46 26.02 <i>v</i>	-7.63

*a* Top of east pier in transit room.*b* Transit instrument pier.*c* Bamberg equatorial.*d* International latitude hut.*e* Seven-inch equatorial.*f* Meridian circle.*g* Center of great dome.*h* Gautier meridian circle.*i* Center of observatory.*j* Center of dome.*k* Pier of small meridian circle.*l* Main floor.*m* Center of rotunda.*n* East transit instrument.*o* Barometer.*p* Old meridian circle.*q* Floor of meridian room.*r* Transit instrument.*s* East transit pier.*t* Snow telescope pier.*u* Floor.*v* West dome.*w* Photographic equatorial, 41 feet south of prime vertical transit.*x* Zenith telescope.

Authority for—		Description.
Latitude.	Longitude.	
Letter from the Dean, 1913. Letter from the Dean, 1913. <i>Memoirs, R. A. S.</i> , 1879. Letter from Director, 1913. Letter, Director new Obs., 1913.	Letter from the Dean, 1913. Letter from the Dean, 1913. See footnote (c). Letter from Director, 1913. Letter, Director new Obs., 1913.	a Fuertes Obs., Cornell Univ. b Fuertes Obs., Cornell Univ. Mr. Hall's Obs., Montego Bay. Univ. Obs., since 1888. Univ. Obs., before 1888.
V. J. S. <i>Astron. Gesell.</i> , 1910. Transvaal Obs. <i>Circular</i> , 1910. Letter from Director, 1913. Letter from Director, 1913. Publications of the Obs., 1911.	V. J. S. <i>Astron. Gesell.</i> , 1910. Transvaal Obs. <i>Circular</i> , 1910. Letter from Director, 1913. Publications of the Obs., 1911. Letter from Director, 1913.	The late Dr. Winkler's Obs. Union Obs., formerly Transvaal Obs. Archiepiscopal Haynald Obs. Engelhardt Obs., Univ. of Kasan. University Observatory.
Letter from Director, 1897. <i>Annales de l'Obs.</i> , Vol. IV, 1893. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913.	Letter from Director, 1897. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Astron. Nach.</i> , Nr. 3993, 1905.	Meteorological Obs., London. Imperial Univ. Obs. d Royal University Obs. Near Aszöd, Hungary. Royal University Obs.
Letter from Director, 1897. Letter from Director, 1913. Letter from Director, 1913. Letter from Director, 1913. Letter, Director new Obs., 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905. Letter from Director, 1913. <i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Astron. Nach.</i> , Nr. 3993, 1905. Letter, Director new Obs., 1913.	Obs. of the Benedictines. National Univ. Obs. University Observatory. University Obs., since 1861. University Obs., before 1861.
<i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>Monthly Notices, R. A. S.</i> , 1894. <i>British Nautical Almanac</i> , 1872. Letter from Director, 1913.	<i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Astron. Nach.</i> , Nr. 3202, 1893. <i>Monthly Notices, R. A. S.</i> , 1894. <i>British Nautical Almanac</i> , 1872. <i>Astron. Nach.</i> , Nr. 3993, 1905.	University Obs., Cointe. Obs. of Liabon. Bldston, Birkenhead, since 1867. Liverpool Obs., before 1867. Royal Univ. Obs., since 1867.
Letter, Director new Obs., 1913. Letter from Director, 1897. Letter from Director, 1897. Publications of the Obs., 1892. <i>Great Trig. Survey of India</i> , 1906.	Letter, Director new Obs., 1913. Letter from Director, 1897. <i>Astron. Nach.</i> , Nr. 3202, 1893. Letter from Director, 1912. <i>Great Trig. Survey of India</i> , 1901.	Royal Univ. Obs., before 1867. Manora Observatory. Obs. of the Univ., St. Genis Laval. Washburn Obs., Univ. of Wis. Obs. founded by East India Co.
<i>Annuario del Obs.</i> , 1912. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>Astron. Nach.</i> , Nr. 758, 1851. Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905. <i>Les Obs. Astron.</i> , Bruxelles, 1907. <i>Lick Obs. Bulletin</i> , 1908. <i>British Nautical Almanac</i> , 1901. <i>Astron. Nach.</i> , Nr. 3993, 1905.	Astron. and Meteorolog. Obs. Meteorological Observatory. Chronom. and Time Sta., Navy Yd. Col. Cooper's Observatory. See footnote (e).
Letter, Director new Obs., 1913. Mag. and Meteor. <i>Results</i> , 1908. <i>Astron. Results</i> , 1881–84. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1894.	Letter, Director new Obs., 1913. Mag. and Meteor. <i>Results</i> , 1908. i <i>Astron. Results</i> , 1881–84. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1894.	See footnote (f). Royal Alfred Obs. g Government Observatory. Seine-et-Oise, near Paris. Wesleyan University Obs.
<i>Pubbl. del R. Osserv.</i> , 1914. Letter from Director, 1913. See footnote (h). Letter from Director, 1913. Letter from Director, 1912.	<i>Astron. Nach.</i> , Nr. 3993, 1905. Letter from Director, 1913. <i>Les Obs. Astron.</i> , Bruxelles, 1907. Letter from Director, 1913. <i>U. S. C. and G. S. Report</i> , 1897.	Royal Observatory, Brera. Obs. Univ. of Minn. International Lat. Obs. Royal Univ. Geophysical Obs. McGill University Obs.
<i>Les Obs. Astron.</i> , Bruxelles, 1907. Publications of the Obs., 1900. <i>Astrophysical Journal</i> , 1906. Letter from C. G. Abbot, 1912. Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905. <i>U. S. C. and G. S. Report</i> , 1897. <i>Astrophysical Journal</i> , 1906. Letter from C. G. Abbot, 1912. <i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. of the Imperial Univ. Lick Obs., Univ. of Cal. Solar Obs., Carnegie Inst. Branch of Smithsonian. Astrophys. Obs. Royal Observatory.

a Since 1902.

b Before 1902.

c *British Report on Transit of Venus*, 1882.

d Old position of meridian circle, 0° 9' N., 0° 12' E.

e National Obs., Univ. of Aix-Marseilles, since 1864–66.

f National Obs., at Accoules, before 1864–66.

g Transferred from Williamstown in 1861.

h *Resultate des Internationalen Breitendienstes*, 1900–1906.

i With the new values of the longitudes of Adelaide and Sydney.

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		' " "	' " "			h m s	s
151	Naples, Italy . . . . .	+40 51 46.3	-11 28.1	164	9.999388	-0 57 1.70 <i>a</i>	- 9.37
152	Nashville, Tenn. . . . .	+36 8 54.4 <i>b</i>	-11 2.0	172 <i>c</i>	9.999505	+5 47 12.2	+57.04
153	Neuchâtel, Switzerland	+46 59 50.6	-11 34.1	488	9.999254	-0 27 49.90 <i>d</i>	- 4.57
154	New Brunswick, N. J. . .	+40 30 1.4 <i>b</i>	-11 26.7	21 <i>b</i>	9.999387	+4 57 47.45 <i>b</i>	+48.92
155	New Haven, Conn. . . . .	+41 19 22.3	-11 29.6	40	9.999368	+4 51 40.58	+47.92
156	New Haven, Conn. . . . .	+41 18 36.5	-11 29.6	...	9.999365	+4 51 42.16	+47.92
157	New York, N. Y. . . . .	+40 48 34.6	-11 27.9	25	9.999380	+4 55 50	+48.60
158	New York, N. Y. . . . .	+40 45 23.1	-11 27.7	...	9.999379	+4 55 53.64	+48.61
159	Nice, France . . . . .	+43 43 16.9 <i>e</i>	-11 34.9	378	9.999330	-0 29 12.15 <i>e</i>	- 4.80
160	Nikolaieff, Russia . . . .	+46 58 22.1	-11 34.2	55	9.999225	-2 7 53.78 <i>a</i>	-21.01
161	Northampton, Mass. . . .	+42 19 1.9 <i>b</i>	-11 32.4	70 <i>b</i>	9.999345	+4 50 33.10 <i>b</i>	+47.73
162	Northfield, Minn. . . . .	+44 27 41.6 <i>f</i>	-11 35.5	290 <i>f</i>	9.999305	+6 12 35.92 <i>f</i>	+61.21
163	Oakland, Cal. . . . .	+37 48 5 <i>d</i>	-11 13.2	11 <i>d</i>	9.999454	+8 9 6.55 <i>d</i>	+80.35
164	Odessa, Russia . . . . .	+46 28 37.5	-11 34.9	...	9.999234	-2 3 2.18 <i>b</i>	-20.21
165	Odessa, Russia . . . . .	+46 28 36.7 <i>d</i>	-11 34.9	55 <i>d</i>	9.999237	-2 3 2.04 <i>d</i>	-20.21
166	O-Gyalla, Hungary . . . .	+47 52 27.3	-11 32.4	113	9.999206	-1 12 45.49	-11.96
167	Omaha, Nebr. . . . .	+41 16 5.6 <i>b</i>	-11 29.5	344 <i>b</i>	9.999390	+6 23 46.96 <i>b</i>	+63.05
168	Orono, Me. . . . .	+44 54 0	-11 35.6	38	9.999277	+4 34 40.3	+45.12
169	Ottawa, Canada . . . . .	+45 23 39.1 <i>d</i>	-11 35.6	85 <i>g</i>	9.999267	+5 2 51.98 <i>d</i>	+49.75
170	Oxford, Miss. . . . .	+34 22 12.6	-10 47.5	...	9.999536	+5 58 7.18	+58.83
171	Oxford, England . . . . .	+51 45 35.6 <i>d</i>	-11 16.9	65 <i>h</i>	9.999104	+0 5 2.6	+ 0.83
172	Oxford, England . . . . .	+51 45 34.2	-11 16.9	64	9.999104	+0 5 0.40	+ 0.82
173	Padua, Italy . . . . .	+45 24 1.0 <i>i</i>	-11 35.6	31 <i>f</i>	9.999263	-0 47 29.13 <i>i</i>	- 7.80
174	Palermo, Sicily . . . . .	+38 6 44.0 <i>k</i>	-11 15.1	76 <i>d</i>	9.999451	-0 53 25.87	- 8.78
175	Paris, France . . . . .	+48 50 11.2 <i>l</i>	-11 29.8	67 <i>m</i>	9.999178	-0 9 20.93 <i>n</i>	- 1.53
176	Perth, West Australia . . .	-31 57 8.9 <i>d</i>	+10 23.8	60	9.999597	-7 43 21.51 <i>d</i>	-76.12
177	Philadelphia, Pa. . . . .	+39 58 2.1 <i>o</i>	-11 24.6	74 <i>o</i>	9.999404	+5 1 6.81 <i>o</i>	+49.46
178	Pola, Austria . . . . .	+44 51 48.6 <i>d</i>	-11 35.6	32 <i>d</i>	9.999277	-0 55 23.07 <i>d</i>	- 9.10
179	Potsdam, Prussia . . . . .	+52 22 56.0 <i>p</i>	-11 13.3	97 <i>p</i>	9.999091	-0 52 15.86 <i>p</i>	- 8.59
180	Poughkeepsie, N. Y. . . .	+41 41 18	-11 30.8	61	9.999360	+4 55 33.6 <i>b</i>	+48.55
181	Prague, Bohemia . . . . .	+50 5 16.0 <i>o</i>	-11 25.1	197 <i>o</i>	9.999155	-0 57 40.28 <i>o</i>	- 9.47
182	Princeton, N. J. . . . .	+40 20 55.8	-11 26.1	75	9.999395	+4 58 39.44	+49.06
183	Princeton, N. J. . . . .	+40 20 57.8 <i>d</i>	-11 26.1	65 <i>d</i>	9.999394	+4 58 37.61 <i>d</i>	+49.06
184	Providence, R. I. . . . .	+41 50 21	-11 31.2	64	9.999356	+4 45 35.95	+46.92
185	Providence, R. I. . . . .	+41 49 46.4	-11 31.2	...	9.999352	+4 45 37.64	+46.92
186	Pulkowa, Russia . . . . .	+59 46 18.7 <i>a</i>	-10 6.2	75 <i>g</i>	9.998914	-2 1 18.57 <i>a</i>	-19.93
187	Quebec, Canada . . . . .	+46 47 59.2	-11 34.4	90	9.999231	+4 44 52.71 <i>b</i>	+46.80
188	Quito, Ecuador . . . . .	- 0 14 0	+ 0 5.6	2908	0.000198	+5 14 6.66	+51.60
189	Riga, Russia . . . . .	+56 57 9.3	-10 36.9	...	9.998974	-1 36 28.10 <i>r</i>	-15.85
190	Rio de Janeiro, Brazil . .	-22 54 23.8 <i>o</i>	+ 8 17.7	62 <i>o</i>	9.999784	+2 52 41.4 <i>o</i>	+28.37
191	Rome, Italy . . . . .	+41 53 53.6 <i>d</i>	-11 31.3	51 <i>f</i>	9.999354	-0 49 55.12 <i>d</i>	- 8.20
192	Rome, Italy . . . . .	+41 53 33.6 <i>d</i>	-11 31.3	65 <i>g</i>	9.999355	-0 49 56.34 <i>d</i>	- 8.20
193	Rome, Italy . . . . .	+41 54 12.4 <i>d</i>	-11 31.4	100 <i>d</i>	9.999357	-0 49 48.02 <i>d</i>	- 8.18
194	Rome, Italy . . . . .	+41 54 16.7	-11 31.4	75 <i>f</i>	9.999355	-0 49 49.28 <i>d</i>	- 8.18
195	San Fernando, Spain . . . .	+36 27 42.0 <i>s</i>	-11 4.3	30 <i>s</i>	9.999488	+0 24 49.32 <i>s</i>	+ 4.08
196	San Fernando, Spain . . . .	+36 31 7	-11 4.7	...	9.999485	+0 25 10.82	+ 4.14
197	San Francisco, Cal. . . . .	+37 47 27.9	-11 13.2	...	9.999454	+8 9 42.86 <i>t</i>	+80.45
198	San Luis, Arg. Rep. . . . .	-33 17 45.7	+10 37.6	800	9.999616	+4 25 22	+43.60
199	Santiago, Chile . . . . .	-33 26 42 <i>d</i>	+10 39.0	520 <i>d</i>	9.999594	+4 42 46.0 <i>d</i>	+46.45
200	Santiago, Chile . . . . .	-33 26 25	+10 38.9	619	9.999600	+4 42 36.5	+46.43
201	Santiago, Chile . . . . .	-33 33 46 <i>b</i>	+10 40.1	580 <i>b</i>	9.999595	+4 42 46 <i>b</i>	+46.45

*o* Center of observatory.  
*b* Transit instrument.  
*c* Bench mark on obs. steps.  
*d* Meridian circle.  
*e* Small meridian circle.  
*f* Meridian circle pier.  
*g* Bench mark in east wall.

*A* Barometer basin.  
*t* Axis of tower.  
*f* Barometer.  
*k* Center of south dome.  
*l* South facade of observatory.  
*m* Level of obs. terrace.  
*n* Cassini's Meridian.

*a* Center of dome.  
*p* Center of middle dome.  
*g* Main floor.  
*r* Tower of school.  
*s* Center of building, ground floor.  
*t* West transit pier.

No.	Authority for—		Description.
	Latitude.	Longitude.	
151	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Royal Obs., Capo di Monte.
152	Letter from the Dean, 1913.	Letter from Director, 1893.	Obs. of Vanderbilt Univ.
153	Swiss Triangulation, 1890.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Cantonal Observatory.
154	Letter from Director, 1913.	Letter from Director, 1913.	Schanck Obs., Rutgers College.
155	Letter from Director, 1893.	See footnote (h).	Yale Univ. Obs., since 1882.
156	Letter, Director new Obs., 1893.	Letter, Director new Obs., 1893.	Yale Univ. Obs., before 1882.
157	<i>Contributions from the Obs.</i> , 1906.	<i>Contributions from the Obs.</i> , 1906.	Columbia Univ. Obs., since 1897.
158	Letter from Director, 1879.	<i>British Nautical Almanac.</i>	Columbia Univ. Obs., before 1897.
159	<i>Annales de l'Obs.</i> , Tome II, 1887.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Mt. Gros, near Nice.
160	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Naval Observatory.
161	Letter from Director, 1913.	<i>Harvard Annals</i> , 1893.	Smith College Obs.
162	Letter from Director, 1912.	<i>Publications of Obs.</i> , 1901.	Goodsell Obs., Carleton College.
163	Letter from Director, 1912.	Letter from Director, 1912.	Chabot Observatory.
164	Pulkowa <i>Mitteilungen</i> , No. 56, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Branch of Pulkowa Obs.
165	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
166	Letter from Director, 1897.	Letter from Director, 1897.	Royal Astrophysical Obs.
167	Letter from Director, 1912.	Letter from Director, 1912.	Creighton University Obs.
168	Letter from Director, 1912.	Letter from Director, 1912.	Obs. Univ. of Maine.
169	Letter from Chief Astronomer, 1913.	Letter from Chief Astronomer, 1913.	Dominion Astronomical Obs.
170	Smithsonian <i>Report</i> , 1880.	Smithsonian <i>Report</i> , 1880.	Obs. Univ. of Mississippi.
171	<i>Radcliffe Catalogue of Stars</i> , 1900.	<i>Radcliffe Observations</i> , 1842.	Radcliffe Observatory.
172	<i>Oxford Astron. Observations</i> , 1878.	<i>Oxford Astron. Observations</i> , 1878.	University Observatory.
173	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal University Obs.
174	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Royal Observatory.
175	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Observatory of Paris.
176	<i>Meridian Observations</i> , Vol. 2, 1908.	<i>Meridian Observations</i> , Vol. 2, 1908.	Government Observatory.
177	Letter from Director, 1913.	Letter from Director, 1913.	Flower Obs., Univ. of Pa.
178	Letter from Director, 1913.	Letter from Director, 1913.	See footnote (b).
179	<i>Veröff. K. Preuss. Geod. Inst.</i> , 1905.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Astrophysical Obs.
180	Smithsonian <i>Report</i> , 1880.	Smithsonian <i>Report</i> , 1880.	Vassar College Obs.
181	<i>Prague Observations</i> , 1907.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial and Royal Obs.
182	Letter from Director, 1913.	Letter from Director, 1913.	Halsted Obs., Princeton Univ.
183	Letter from Director, 1913.	<i>Washington Observations</i> , 1878.	Obs. of Instruction, Princeton Univ.
184	Letter from Director, 1893.	Letter from Director, 1893.	Ladd Obs., Brown Univ.
185	<i>Astron. Nach.</i> , Nr. 2254, 1879.	<i>Astron. Nach.</i> , Nr. 2254, 1879.	Mr. Seagrave's Observatory.
186	<i>Description de l'Obs.</i> , 1845.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. Central Nicolas.
187	Letter from Director, 1912.	Letter from Director, 1912.	Quebec Obs., Plains of Abraham.
188	Letter from Director, 1897.	Letter from Director, 1897.	National Observatory.
189	Letter from Director, 1897.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Polytechnic School Obs.
190	See footnote (c).	See footnote (c).	National Observatory.
191	<i>Memorie del R. Osserv.</i> , 1904.	Letter from Director, 1913.	Royal Obs. at Roman College.
192	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Royal Univ. Obs. at Capitol.
193	Letter from Director, 1913.	Letter from Director, 1913.	Vatican Obs., since 1906-7.
194	<i>Pubb. della Specola Vaticana</i> , 1905.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Vatican Obs., before 1906-7.
195	<i>Annales del Obs.</i> , 1892.	Letter from Director, 1913.	Naval Obs., since 1797.
196	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Naval Obs., before 1797.
197	Letter from Director, 1897.	<i>U. S. C. and G. S. Report</i> , 1897.	Davidson Observatory.
198	Letter from Director, 1911.	Letter from Director, 1911.	Southern Obs. of Carnegie Inst.
199	Letter from Director, 1913.	Letter from Director, 1913.	National Obs., since 1862.
200	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	National Obs., before 1862.
201	Letter from Director, 1913.	Letter from Director, 1913.	National Obs., Espejo.

<sup>a</sup> Old observatory, 1877-1886, 415 feet W.

<sup>b</sup> Observatory of Imperial and Royal Hydrographic Office.

<sup>c</sup> Green and Davis, *Telegraphic Determinations of Longitudes on the East Coast of South America*, 1880.

<sup>d</sup> In the Gregorian tower.

<sup>e</sup> In Cadix.

<sup>f</sup> In Quinta Normal.

<sup>g</sup> On the hill Santa Lucia, in Santiago.

<sup>h</sup> Based upon data from the U. S. C. and G. Survey.

<sup>i</sup> With the new value of the longitude of Sydney.

No.	Place.	Latitude.	Reduction to Geocen- tric Latitude.	Altitude (Meters).	Log $\rho$ (Including altitude).	Longitude from Greenwich.	Reduction from Green- wich to Local S.T.M.N.
		° ' "	° ' "			h m s	s
202	South Bethlehem, Pa. . .	+40 36 23.2 <sup>a</sup>	-11 27.2	110	9.999391	+ 5 1 31.96 <sup>a</sup>	+ 49.53
203	South Hadley, Mass. . .	+42 15 18.2 <sup>b</sup>	-11 32.2	76 <sup>b</sup>	9.999346	+ 4 50 20.40 <sup>b</sup>	+ 47.70
204	St. Louis, Mo. . .	+38 38 3.0	-11 18.1	. . .	9.999432	+ 6 0 49.26	+ 59.27
205	St. Petersburg, Russia . .	+59 56 32.0	-10 4.2	4	9.998906	- 2 1 11.4	- 19.91
206	Stockholm, Sweden . .	+59 20 32.7 <sup>c</sup>	-10 11.3	44 <sup>c</sup>	9.998922	- 1 12 13.97 <sup>c</sup>	- 11.87
207	Stonyhurst, England . .	+53 50 40	-11 3.4	117 <sup>c</sup>	9.999056	+ 0 9 52.68	+ 1.62
208	Strassburg, Alsace . .	+48 35 0.3 <sup>c</sup>	-11 30.5	144 <sup>c</sup>	9.999190	- 0 31 4.52 <sup>c</sup>	- 5.11
209	Swarthmore, Pa. . .	+39 54 23.3	-11 24.3	. . .	9.999401	+ 5 1 24.89	+ 49.52
210	Sydney, N. S. W. . .	-33 51 41.1	+10 42.9	44	9.999552	-10 4 49.31	- 99.36
211	Syracuse, N. Y. . .	+43 2 13.1	-11 33.9	160	9.999332	+ 5 4 33.36	+ 50.03
212	Syracuse, N. Y. . .	+43 0 48.8 <sup>h</sup>	-11 33.8	137 <sup>h</sup>	9.999332	+ 5 4 34.31 <sup>h</sup>	+ 50.03
213	Tacubaya, Mexico . .	+19 24 17.9 <sup>c</sup>	- 7 14.8	2285 <sup>c</sup>	9.999995	+ 6 36 46.67 <sup>c</sup>	+ 65.18
214	Tashkent, Turkestan . .	+41 19 31.3	-11 29.6	457	9.999396	+ 4 37 10.80	- 45.53
215	Taunton, Mass. . .	+41 54 0	-11 31.3	8	9.999351	+ 4 44 20	+ 46.71
216	Teramo, Italy . .	+42 39 27 <sup>d</sup>	-11 33.1	398	9.999358	- 0 54 56	- 9.02
217	Tokyo, Japan . .	+35 39 17.0 <sup>c</sup>	-10 58.3	25	9.999507	- 9 18 58.22 <sup>c</sup>	- 91.82
218	Toronto, Canada . .	+43 39 46.0 <sup>f</sup>	-11 34.8	110 <sup>g</sup>	9.999313	+ 5 17 34.70 <sup>g</sup>	+ 52.17
219	Toronto, Canada . .	+43 40 0.8 <sup>g</sup>	-11 34.8	116 <sup>g</sup>	9.999313	+ 5 17 35.60 <sup>g</sup>	+ 52.17
220	Toulouse, France . .	+43 36 44.0	-11 34.7	194	9.999320	- 0 5 51.23	- 0.96
221	Triest, Austria . .	+45 38 35.5 <sup>h</sup>	-11 35.5	68 <sup>i</sup>	9.999260	- 0 55 5.23 <sup>h</sup>	- 9.05
222	Triest, Austria . .	+45 38 45.4 <sup>j</sup>	-11 35.5	26 <sup>i</sup>	9.999257	- 0 55 3.0	- 9.04
223	Tschardjui, Turkestan . .	+39 8 11.0 <sup>d</sup>	-11 20.7	188 <sup>d</sup>	9.999433	- 4 14 17.2 <sup>d</sup>	- 41.77
224	Tschardjui, Turkestan . .	+39 8 10.7 <sup>d</sup>	-11 20.7	167	9.999431	- 4 13 57.3	- 41.72
225	Tulse Hill, England . .	+51 26 47	-11 18.6	48	9.999111	+ 0 0 27.7	+ 0.08
226	Turin, Italy . .	+45 2 16.2 <sup>k</sup>	-11 35.7	618 <sup>k</sup>	9.999313	- 0 31 3	- 5.10
227	Turin, Italy . .	+45 4 8.3 <sup>c</sup>	-11 35.7	276 <sup>i</sup>	9.999288	- 0 30 47.15 <sup>c</sup>	- 5.06
228	Tuscaloosa, Ala. . .	+33 12 36.8 <sup>c</sup>	-10 36.7	69	9.999568	+ 5 50 11.74 <sup>c</sup>	+ 57.53
229	Ukiah Cal. . .	+39 8 12.1 <sup>d</sup>	-11 20.7	220 <sup>d</sup>	9.999435	+ 8 12 50.3 <sup>d</sup>	+ 80.96
230	Uppsala, Sweden . .	+59 51 29.4 <sup>b</sup>	-10 5.2	21 <sup>b</sup>	9.998909	- 1 10 30.12 <sup>b</sup>	- 11.58
231	Urbana, Ill. . .	+40 6 20.2 <sup>i</sup>	-11 25.2	236 <sup>i</sup>	9.999412	+ 5 52 53.90 <sup>i</sup>	+ 57.97
232	Utrecht, Netherlands . .	+52 5 9.7 <sup>m</sup>	-11 15.0	12 <sup>m</sup>	9.999093	- 0 20 31.0 <sup>m</sup>	- 3.37
233	Utrecht, Netherlands . .	+52 5 13	-11 15.0	23	9.999093	- 0 20 28.9	- 3.36
234	Venice, Italy . .	+45 26 10.5 <sup>c</sup>	-11 35.6	15 <sup>c</sup>	9.999261	- 0 49 22.12 <sup>c</sup>	- 8.11
235	Vienna, Austria . .	+48 13 55.1 <sup>n</sup>	-11 31.5	240 <sup>i</sup>	9.999205	- 1 5 21.35 <sup>n</sup>	- 10.74
236	Vienna, Austria . .	+48 12 35.5	-11 31.6	186 <sup>i</sup>	9.999202	- 1 5 31.61	- 10.76
237	Vienna, Austria . .	+48 12 53.8	-11 31.6	214	9.999204	- 1 5 25.17	- 10.75
238	Vienna, Austria . .	+48 12 46.7 <sup>c</sup>	-11 31.6	285	9.999209	- 1 5 10.96	- 10.71
239	Warsaw, Russia . .	+52 13 4.6 <sup>c</sup>	-11 14.3	121 <sup>c</sup>	9.999097	- 1 24 7.25 <sup>c</sup>	- 13.82
240	Washington, D. C. . .	+38 55 14.0 <sup>o</sup>	-11 19.6	82 <sup>p</sup>	9.999431	+ 5 8 15.78 <sup>o</sup>	+ 50.64
241	Washington, D. C. . .	+38 53 38.7 <sup>q</sup>	-11 19.4	31 <sup>r</sup>	9.999428	+ 5 8 12.15 <sup>q</sup>	+ 50.63
242	Washington, D. C. . .	+38 53 17.3 <sup>s</sup>	-11 19.4	10 <sup>s</sup>	9.999427	+ 5 8 6.24 <sup>s</sup>	+ 50.61
243	Washington, D. C. . .	+38 56 14.8 <sup>a</sup>	-11 19.7	. . .	9.999425	+ 5 8 0.0 <sup>a</sup>	+ 50.60
244	Wellesley, Mass. . .	+42 17 34.8	-11 32.3	61	9.999344	+ 4 45 12.7	+ 46.85
245	Wellington, N. Z. . .	-41 17 3.8 <sup>b</sup>	+11 29.5	127 <sup>b</sup>	9.999375	-11 39 4.27 <sup>b</sup>	-114.84
246	West Point, N. Y. . .	+41 23 22.1	-11 29.9	170	9.999375	+ 4 55 50.55	+ 48.60
247	Wilhelmshaven, Germany	+53 31 52.1 <sup>c</sup>	-11 5.7	9 <sup>c</sup>	9.999057	- 0 32 35.06 <sup>c</sup>	- 5.35
248	Williams Bay, Wis. . .	+42 34 12.6 <sup>t</sup>	-11 33.0	320 <sup>t</sup>	9.999355	+ 5 54 13.24 <sup>t</sup>	+ 56.19
249	Williamstown, Mass. . .	+42 42 30	-11 33.2	213	9.999344	+ 4 52 50	+ 48.10
250	Winchester, Mass. . .	+42 27 11	-11 32.7	30	9.999338	+ 4 44 32.4	+ 46.74
251	Windsor, N. S. W. . .	-33 36 30.8 <sup>b</sup>	+10 40.6	16 <sup>r</sup>	9.999556	-10 3 19.9	- 99.11
252	Zô-Sô, China . .	+31 5 48.0 <sup>c</sup>	-10 14.4	100 <sup>c</sup>	9.999619	- 8 4 44.82 <sup>c</sup>	- 79.63
253	Zurich, Switzerland . .	+47 22 38.3 <sup>c</sup>	-11 33.5	469 <sup>c</sup>	9.999243	- 0 34 12.26 <sup>c</sup>	- 5.62

<sup>a</sup> Center of dome.<sup>b</sup> Transit instrument.<sup>c</sup> Meridian circle.<sup>d</sup> Zenith telescope.<sup>e</sup> Great transit instrument.<sup>f</sup> Main dome.<sup>g</sup> Transit pier.<sup>h</sup> Equatorial pier.<sup>i</sup> Barometer cistern.<sup>j</sup> Stone pier in terrace wall.<sup>k</sup> Prime vertical instrument.<sup>l</sup> 112-inch equatorial.<sup>m</sup> Altazimuth pier.<sup>n</sup> Central dome.<sup>o</sup> Center of the clock room.<sup>p</sup> Ground floor of main building.<sup>q</sup> Small dome.<sup>r</sup> Barometer.<sup>s</sup> Sidereal pier.<sup>t</sup> 40-inch equatorial.<sup>u</sup> Intersection of equatorial axes.

No.	Authority for—		Description.
	Latitude.	Longitude.	
202	Letter from Director, 1913.	<i>Washington Observations</i> , 1875.	Sayre Obs., Lehigh Univ.
203	<i>Amer. Jour. of Sci.</i> , 1883.	Letter from Director, 1913.	Willston Obs., Mt. Holyoke Coll.
204	Letter from Director, 1897.	<i>U. S. C. and G. S. Report</i> , 1897.	<sup>a</sup> Washington University Obs.
205	<i>Astron. Nach.</i> , Nr. 2582, 1884.	<i>Astron. Nach.</i> , Nr. 2582, 1884.	Imperial University Obs.
206	Letter from Director, 1914.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Obs. of Acad. of Sci.
207	Letter from Director, 1913.	<i>Monthly Notices, R. A. S.</i> , 1851.	Stonyhurst College Obs.
208	<i>Annalen der Sternw.</i> , 1896.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Univ. Obs.
209	Letter from Director, 1912.	Letter from Director, 1912.	Sproul Obs., Swarthmore College.
210	<i>Astron. Results</i> , 1879–81.	See footnote (b).	Government Observatory.
211	Letter from Director, 1891.	Letter from Director, 1891.	Syracuse Univ. Obs.
212	Letter from Director, 1914.	Letter from Director, 1914.	Roe Observatory.
213	<i>Boletin del Obs.</i> , 1914.	<i>Annuario del Obs.</i> , 1902.	National Observatory.
214	Letter from Director, 1897.	Letter from Director, 1897.	Tashkent Observatory.
215	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Mr. Metcalf's Obs., before 1911.
216	<i>Pubbl. dell'Osserv.</i> , 1900.	Letter from Director, 1913.	Collurania Observatory.
217	<i>Annales de l'Obs.</i> , 1894.	<i>Annales de l'Obs.</i> , 1894.	University Observatory.
218	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
219	Letter from Director, 1912.	Letter from Director, 1912.	Meteorological Observatory.
220	<i>Annales de l'Obs.</i> , 1912.	<i>British Nautical Almanac.</i>	University Observatory.
221	Letter from Director, 1913.	Letter from Director, 1913.	<sup>c</sup> Imperial and Royal Maritime Obs.
222	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>d</sup> Imperial and Royal Maritime Obs.
223	<i>Astron. Nach.</i> , Nr. 4588, 1912.	Letter from Director, 1913.	International Lat. Obs., since 1909.
224	See footnote (e).	See footnote (f).	International Lat. Obs., before 1909.
225	<i>British Nautical Almanac.</i>	<i>British Nautical Almanac.</i>	Obs. of Sir W. Huggins, London.
226	Letter from Director, 1913.	Letter from Director, 1913.	<sup>f</sup> Royal Obs. of the Univ., since 1913.
227	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>g</sup> Royal Obs. of the Univ., before 1913.
228	Letter from Director, 1897.	Letter from Director, 1897.	Obs. Univ. of Ala.
229	See footnote (e).	Letter from Director, 1912.	International Lat. Obs.
230	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	University Observatory.
231	Letter from Director, 1913.	Letter from Director, 1913.	Obs., Univ. of Ill.
232	Letter from Director, 1913.	Letter from Director, 1913.	University Obs., since 1855.
233	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	University Obs., before 1855.
234	Letter from Director, 1913.	Letter from Director, 1913.	Obs. of the Nautical Institute.
235	See footnote (h).	<i>Astron. Nach.</i> , Nr. 3993, 1905.	<sup>i</sup> Imperial and Royal Univ. Obs.
236	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	<sup>j</sup> Imperial and Royal Univ. Obs.
237	<i>Berliner Jahrbuch.</i>	<i>Berliner Jahrbuch.</i>	Oppolzer Obs., Josephstadt.
238	<i>Publik. der Sternw.</i> , 1892.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Kuffner Obs., Ottakring.
239	<i>Astron. Nach.</i> , Nr. 4666, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial University Obs.
240	<i>U. S. Naval Obs. Publications</i> , 1900.	<i>U. S. C. and G. S. Report</i> , 1897.	U. S. N. Obs., Georgetown Heights.
241	See footnote (m).	<i>U. S. C. and G. S. Report</i> , 1897.	U. S. Naval Obs., 1842–1893.
242	Letter from Director, 1912.	Letter from Director, 1912.	Smithsonian Astrophysical Obs.
243	<i>Astronomical Journal</i> , 1897.	<i>Astronomical Journal</i> , 1897.	Catholic Univ. Obs., Brookland.
244	Letter from Director, 1912.	<i>Les Obs. Astron.</i> , Bruxelles, 1907.	Whitin Obs., Wellesley College.
245	<i>New Zealand Gazette</i> , May 7, 1914.	<i>New Zealand Gazette</i> , May 7, 1914.	Hector Observatory.
246	Letter from Director, 1891.	Letter from Director, 1891.	<sup>k</sup> U. S. Military Academy.
247	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3993, 1905.	Imperial Naval Obs.
248	<i>Astrophysical Journal</i> , 1901.	<i>Astrophysical Journal</i> , 1901.	Yerkes Obs., Univ. of Chicago.
249	Letter from Director, 1893.	Letter from Director, 1893.	Field Memorial Obs., Williams Coll.
250	Letter from Director, 1913.	Letter from Director, 1913.	Mr. Metcalf's Obs., since 1911.
251	<i>Monthly Notices, R. A. S.</i> , 1884.	<sup>n</sup> <i>Monthly Notices, R. A. S.</i> , 1888.	Mr. John Tebbutt's Obs.
252	<i>Annales de l'Obs.</i> , 1907.	<i>Annales de l'Obs.</i> , 1907.	Obs. of the Jesuits near Shanghai.
253	Letter from Director, 1913.	<i>Astron. Nach.</i> , Nr. 3202, 1893.	Obs. of Swiss Polytechnic School.

<sup>a</sup> Old observatory 0° 125' E.

<sup>b</sup> Letter from Government Astronomer at Adelaide, 1913.

<sup>c</sup> Since 1898.

<sup>d</sup> Before 1898.

<sup>e</sup> *Resultate des Internationalen Breitendienstes*, 1900–1908.

<sup>f</sup> At Pino Torinese.

<sup>g</sup> At Palazzo Madama.

<sup>h</sup> *Astron. Arbeiten des K. K. Gradmessungs-Bureau*, 1896.

<sup>i</sup> Since 1879.

<sup>j</sup> Before 1879.

<sup>k</sup> Old observatory 9° N., 1° 2' E.

<sup>l</sup> *Resultate des Internationalen Breitendienstes*, Band I, 1908.

<sup>m</sup> *Washington Observations for 1892*, Appendix I, pp. XXX and XXXII.

<sup>n</sup> And the new value of the longitude of Sydney.

## THE COMPUTATION OF LUNAR DISTANCES.

Tables of lunar distances are no longer given in the Ephemeris, in accordance with the decision of the Navy Department that they are now of little practical use to navigators. However, in case it is desired to use this method, the angular distance between the Moon and any heavenly body may be calculated by solving the spherical triangle of which the known parts are the polar distances of the Moon and the other body and the difference of their right ascensions, or, in other words, the angle at the pole between their hour-circles. Then, the Greenwich mean time of the observation being approximately known, and the lunar distances for the star or other body calculated for the even hour before and after, the required lunar distance may be interpolated and the longitude derived by the methods given in books on navigation.

## EXAMPLE 1.

Find the lunar distance of Aldebaran, March 5, 1917, at 10 P. M., Greenwich Mean Time.

Let  $\alpha$  and  $\delta$  - Right Ascension and Declination of the star  
 "  $\alpha'$  and  $\delta'$  - " " " " " Moon  
 " D - Lunar Distance  
 Also let  $\tan M = \tan \delta' \sec (\alpha - \alpha')$   
 Then  $\cos D = \sin \delta' \cos (M - \delta) \operatorname{cosec} M$

$\alpha = 4^h 31^m 11^s.0$	$M = 33^\circ 53' 48''$
$\alpha' = 8^h 55^m 24^s.6$	$\delta = +16^\circ 20' 41''$
$\alpha - \alpha' = 19^h 35^m 46^s.4$	$M - \delta = 17^\circ 33' 7''$
$\alpha - \alpha' = 293^\circ 56' 36''$	$\sin \delta' = 9.420069$
$\delta' = + 15^\circ 15' 8''$	$\cos (M - \delta) = 9.979295$
$\tan \delta' = 9.435642$	$\operatorname{cosec} M = 0.253602$
$\sec (\alpha - \alpha') = 0.391653$	$\cos D = 9.652966$
$\tan M = 9.827295$	$D = 63^\circ 16' 22''$

## EXAMPLE 2.

Find the lunar distance of Jupiter March 26, 1917, at noon, Greenwich Mean Time. In this case the distance is smaller and the following method is more accurate.

Let  $\alpha$  and  $\delta$  - Right Ascension and Declination of the planet  
 "  $\alpha'$  and  $\delta'$  - " " " " " Moon  
 " D - Lunar Distance  
 Also let  $\tan N = \tan \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} \frac{1}{2} (\delta - \delta')$   
 Then  $\sin \frac{1}{2} D = \sin \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} N$   
 Sin N and  $\sin \frac{1}{2} (\alpha - \alpha')$  have the same algebraic sign.

$\alpha = 2^h 23^m 57^s.5$	$\tan \frac{1}{2} (\alpha - \alpha') = 8.920918 n$
$\alpha' = 3^h 2^m 4^s.6$	$\cos \frac{1}{2} (\delta + \delta') = 9.979520$
$\alpha - \alpha' = 23^h 21^m 52^s.9$	$\operatorname{cosec} \frac{1}{2} (\delta - \delta') = 1.142053 n$
$\alpha - \alpha' = 350^\circ 28' 14''$	$\tan N = 0.042491$
$\delta = + 13^\circ 19' 23''$	$N = 47^\circ 47' 54''$
$\delta' = + 21^\circ 35' 33''$	$\sin \frac{1}{2} (\alpha - \alpha') = 8.919414$
$\delta + \delta' = + 34^\circ 54' 56''$	$\cos \frac{1}{2} (\delta + \delta') = 9.979520$
$\delta - \delta' = - 8^\circ 16' 10''$	$\operatorname{cosec} N = 0.130308$
$\frac{1}{2} (\alpha - \alpha') = 175^\circ 14' 7''$	$\sin \frac{1}{2} D = 9.029242$
$\frac{1}{2} (\delta + \delta') = + 17^\circ 27' 28''$	$\frac{1}{2} D = 6^\circ 8' 25''$
$\frac{1}{2} (\delta - \delta') = - 4^\circ 8' 5''$	$D = 12^\circ 16' 50''$

## FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Reduce the observed altitude of Polaris to the true altitude.

Reduce the recorded time of observation to the local sidereal time.

Take out the apparent right ascension and declination of Polaris for the time of observation.

Subtract the apparent right ascension from the local sidereal time of observation and the remainder is the hour-angle of Polaris.

With this hour-angle as the vertical argument, and the apparent declination of Polaris as the horizontal argument, take out the correction from Table I and add it to or subtract it from the true altitude, according to its sign.

For other altitudes than  $45^\circ$ , corrections taken from the supplementary table at the bottom of Table I (Table Ia) may be applied when necessary for the degree of accuracy required.

*Example.*—1917, August 5, at  $10^h 40^m 30^s$  P. M. local mean solar time, in longitude  $59^\circ$  west of Greenwich, suppose the true altitude of Polaris to be  $33^\circ 20' 0''$ , required the latitude of the place.

Local astronomical mean time	h	m	s
Reduction from Table III for $10^h 40^m 30^s$	10	40	30
Greenwich sidereal time of mean noon, August 5, page 10		+ 1	45
Reduction from Table III, for longitude ( $-3^h 56^m$ west, or plus)	8	53	52
		+ 0	39
Sum (having regard to signs) is equal to local sidereal time	h	m	s
R. A. of Polaris (page 281) for time of observation	19	36	46
	1	30	56
Remainder is equal to hour-angle of Polaris	h	m	s
Decl. of Polaris (page 281) for time of observation, $88^\circ 51' 43''$	18	5	50
True altitude			"
Correction from Table I	+33	20	0
Correction from Table Ia	-1		4
			-14
Latitude of the place			"
	+33	18	42

Observations of Polaris for latitude should be made when practicable near the times of upper or of lower culminations (hour-angle  $0^h$  or  $12^h$ ). However, at sea, if made near elongation (hour-angle  $6^h$  or  $18^h$ ), the hour-angle, and hence the local time, should be known within one minute.

Decl. H. A.	$88^\circ 51' 40''$	$88^\circ 51' 50''$	$88^\circ 52' 0''$	$88^\circ 52' 10''$	$88^\circ 52' 20''$	$88^\circ 52' 30''$	Decl. H. A.
h m	' "	' "	' "	' "	' "	' "	h m
0 0	-68 20 0	-68 10 0	-68 0 0	-67 50 0	-67 40 0	-67 30 0	24 0
3	68 20 1	68 10 1	68 0 1	67 50 1	67 40 1	67 30 1	23 57
6	68 19 2	68 9 2	67 59 2	67 49 2	67 39 2	67 29 2	54
9	68 17 3	68 7 3	67 57 3	67 47 3	67 37 3	67 27 3	51
12	68 14 3	68 4 3	67 54 3	67 44 3	67 34 3	67 24 3	48
0 15	-68 11 4	-68 1 4	-67 51 4	-67 41 4	-67 31 4	-67 21 4	23 45
18	68 7 5	67 57 5	67 47 5	67 37 5	67 27 5	67 17 5	42
21	68 2 5	67 52 5	67 43 5	67 33 5	67 23 5	67 13 5	39
24	67 57 6	67 47 6	67 37 6	67 27 6	67 17 6	67 7 6	36
27	67 51 7	67 41 7	67 31 7	67 21 7	67 11 7	67 1 7	33
0 30	-67 44 7	-67 34 7	-67 24 7	-67 14 7	-67 4 7	-66 55 8	23 30
33	67 37 8	67 27 8	67 17 8	67 7 8	66 57 8	66 47 8	27
36	67 29 9	67 19 9	67 9 9	66 59 9	66 49 9	66 39 9	24
39	67 20 10	67 10 10	67 0 10	66 50 10	66 40 10	66 30 10	21
42	67 10 11	67 0 11	66 50 11	66 41 11	66 31 11	66 21 11	18
0 45	-67 0 11	-66 50 11	-66 40 11	-66 30 11	-66 20 11	-66 11 11	23 15
48	66 49 12	66 39 12	66 29 12	66 19 12	66 9 12	66 0 12	12
51	66 37 13	66 27 13	66 17 13	66 8 13	65 58 13	65 48 13	9
54	66 24 13	66 15 13	66 5 13	65 55 13	65 46 13	65 36 13	6
0 57	66 11 13	66 2 13	65 52 13	65 42 13	65 33 13	65 23 13	3
1 0	-65 58 15	-65 48 15	-65 38 15	-65 29 15	-65 19 15	-65 9 15	23 0
3	65 43 15	65 34 15	65 24 15	65 14 15	65 5 15	64 55 15	22 57
6	65 28 16	65 18 16	65 9 16	64 59 16	64 50 16	64 40 16	54
9	65 12 16	65 2 16	64 53 16	64 43 16	64 34 16	64 24 16	51
1 12	-64 56 16	-64 46 16	-64 36 16	-64 27 16	-64 18 16	-64 8 16	22 48



FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Decl. H. A.	88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	Decl. H. A.
h m	' "	' "	' "	' "	' "	' "	h m
1 12	-64 56 18	-64 46 17	-64 36 17	-64 27 17	-64 18 18	-64 8 17	22 48
15	64 38 18	64 29 18	64 19 17	64 10 18	64 0 17	63 51 18	45
18	64 20 18	64 11 19	64 2 19	63 52 18	63 43 19	63 33 18	42
21	64 2 20	63 52 19	63 43 19	63 34 19	63 24 19	63 15 19	39
24	63 42 20	63 33 20	63 24 20	63 15 20	63 5 19	62 56 20	36
1 27	-63 22 20	-63 13 20	-63 4 20	-62 55 21	-62 46 21	-62 36 20	22 33
30	63 2 21	62 53 21	62 44 21	62 34 21	62 25 21	62 16 21	30
33	62 41 22	62 32 22	62 23 22	62 13 21	62 4 22	61 55 22	27
36	62 19 23	62 10 23	62 1 23	61 52 23	61 42 22	61 33 22	24
39	61 56 23	61 47 23	61 38 23	61 29 23	61 20 23	61 11 23	21
1 42	-61 33 24	-61 24 24	-61 15 24	-61 6 24	-60 57 23	-60 48 23	22 18
45	61 9 24	61 0 25	60 51 24	60 42 24	60 34 25	60 25 24	15
48	60 45 25	60 35 25	60 27 25	60 18 25	60 9 25	60 1 25	12
51	60 20 26	60 10 25	60 2 25	59 53 25	59 44 25	59 36 26	9
54	59 54 26	59 45 26	59 37 27	59 28 26	59 19 26	59 10 26	6
1 57	-59 23 27	-59 19 27	-59 10 27	-59 2 27	-58 53 27	-58 44 26	22 3
2 0	59 1 28	58 52 28	58 43 27	58 35 28	58 26 27	58 18 28	22 0
3	58 33 28	58 24 28	58 16 28	58 7 28	57 59 28	57 50 28	21 57
6	58 5 29	57 56 28	57 48 29	57 39 28	57 31 29	57 22 28	54
9	57 36 29	57 28 30	57 19 29	57 11 29	57 2 29	56 54 29	51
2 12	-57 7 30	-56 58 30	-56 50 30	-56 42 30	-56 33 29	-56 25 30	21 48
15	56 37 31	56 28 30	56 20 30	56 12 31	56 4 31	55 55 30	45
18	56 6 31	55 58 31	55 50 31	55 41 31	55 33 31	55 25 31	42
21	55 35 32	55 27 32	55 19 32	55 10 31	55 2 31	54 54 31	39
24	55 3 32	54 55 32	54 47 32	54 39 32	54 31 32	54 23 32	36
2 27	-54 31 33	-54 23 33	-54 15 33	-54 7 33	-53 59 33	-53 51 33	21 33
30	53 58 34	53 50 34	53 42 33	53 34 33	53 26 33	53 18 33	30
33	53 24 34	53 16 34	53 9 34	53 1 34	52 53 34	52 45 33	27
36	52 50 34	52 42 34	52 35 34	52 27 34	52 19 34	52 12 34	24
39	52 16 35	52 8 35	52 1 35	51 53 35	51 45 34	51 38 35	21
2 42	-51 41 36	-51 33 35	-51 26 36	-51 18 35	-51 11 36	-51 3 35	21 18
45	51 5 36	50 58 36	50 50 36	50 43 36	50 35 36	50 28 36	15
48	50 29 37	50 22 37	50 14 36	50 7 37	49 59 36	49 52 36	12
51	49 52 37	49 45 37	49 38 37	49 30 37	49 23 37	49 16 37	9
54	49 15 38	49 8 38	49 1 38	48 53 37	48 46 37	48 39 37	6
2 57	-48 37 38	-48 30 38	-48 23 38	-48 16 38	-48 9 38	-48 2 38	21 3
3 0	47 59 39	47 52 39	47 45 39	47 38 38	47 31 38	47 24 38	21 0
3	47 20 39	47 13 39	47 6 39	47 0 39	46 53 39	46 46 39	20 57
6	46 41 40	46 34 39	46 27 39	46 21 40	46 14 39	46 7 39	54
9	46 1 40	45 55 40	45 48 40	45 41 40	45 35 40	45 28 40	51
3 12	-45 21 41	-45 15 41	-45 8 40	-45 1 40	-44 55 40	-44 48 40	20 48
15	44 40 41	44 34 41	44 28 41	44 21 41	44 15 41	44 8 41	45
18	43 59 41	43 53 41	43 47 42	43 40 41	43 34 41	43 27 41	42
21	43 18 42	43 12 42	43 5 42	42 59 42	42 53 42	42 46 41	39
24	42 36 43	42 30 43	42 23 42	42 17 42	42 11 42	42 5 42	36
3 27	-41 53 43	-41 47 43	-41 41 42	-41 35 42	-41 29 42	-41 23 42	20 33
30	41 10 43	41 4 43	40 59 43	40 53 43	40 47 43	40 41 43	30
33	40 27 43	40 21 43	40 16 44	40 10 44	40 4 43	39 58 43	27
36	39 44 44	39 38 44	39 32 44	39 26 44	39 21 44	39 15 44	24
39	39 00 45	38 54 45	38 48 44	38 42 44	38 37 44	38 31 44	21
3 42	-38 15 45	-38 9 45	-38 4 45	-37 58 44	-37 53 45	-37 47 44	20 18
45	37 30 45	37 24 45	37 19 45	37 14 45	37 8 45	37 3 45	15
48	36 45 46	36 39 45	36 34 46	36 29 46	36 23 45	36 18 45	12
51	35 59 46	35 54 46	35 48 46	35 43 46	35 38 45	35 33 45	9
54	35 13 46	35 8 46	35 3 46	34 58 46	34 53 46	34 47 45	6
3 57	-34 27 47	-34 22 47	-34 17 47	-34 12 47	-34 7 47	-34 2 47	20 3
4 0	33 40 47	33 35 47	33 30 47	33 25 47	33 20 46	33 15 46	20 0
3	32 53 47	32 48 47	32 43 47	32 38 47	32 34 47	32 29 46	19 57
6	32 5 48	32 0 48	31 56 47	31 51 47	31 47 48	31 42 47	54
4 9	-31 17 48	-31 13 47	-31 8 48	-31 4 47	-30 59 48	-30 55 47	19 51

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Decl. H. A.	88° 51' 40"	88° 51' 50"	88° 52' 0"	88° 52' 10"	88° 52' 20"	88° 52' 30"	Decl. H. A.
h m	' "	' "	' "	' "	' "	' "	h m
4 9	-31 17 <sup>48</sup>	-31 13 <sup>48</sup>	-31 8 <sup>48</sup>	-31 4 <sup>46</sup>	-30 59 <sup>47</sup>	-30 55 <sup>48</sup>	19 51
12	30 29 <sup>48</sup>	30 25 <sup>49</sup>	30 20 <sup>48</sup>	30 16 <sup>48</sup>	30 12 <sup>48</sup>	30 7 <sup>48</sup>	48
15	29 41 <sup>49</sup>	29 36 <sup>49</sup>	29 32 <sup>49</sup>	29 28 <sup>48</sup>	29 24 <sup>48</sup>	29 19 <sup>48</sup>	45
18	28 52 <sup>49</sup>	28 47 <sup>48</sup>	28 43 <sup>48</sup>	28 40 <sup>48</sup>	28 36 <sup>48</sup>	28 31 <sup>48</sup>	42
21	28 3 <sup>49</sup>	27 59 <sup>49</sup>	27 55 <sup>48</sup>	27 51 <sup>49</sup>	27 47 <sup>49</sup>	27 43 <sup>48</sup>	39
4 24	-27 14 <sup>50</sup>	-27 10 <sup>50</sup>	-27 6 <sup>49</sup>	-27 2 <sup>49</sup>	-26 58 <sup>49</sup>	-26 54 <sup>49</sup>	19 36
27	26 24 <sup>50</sup>	26 20 <sup>49</sup>	26 17 <sup>50</sup>	26 13 <sup>49</sup>	26 9 <sup>49</sup>	26 5 <sup>49</sup>	33
30	25 34 <sup>50</sup>	25 31 <sup>50</sup>	25 27 <sup>50</sup>	25 24 <sup>50</sup>	25 20 <sup>50</sup>	25 16 <sup>49</sup>	30
33	24 44 <sup>50</sup>	24 41 <sup>50</sup>	24 37 <sup>50</sup>	24 34 <sup>50</sup>	24 30 <sup>50</sup>	24 27 <sup>49</sup>	27
36	23 54 <sup>51</sup>	23 51 <sup>51</sup>	23 47 <sup>50</sup>	23 44 <sup>50</sup>	23 40 <sup>50</sup>	23 37 <sup>50</sup>	24
4 39	-23 3 <sup>51</sup>	-23 0 <sup>51</sup>	-22 57 <sup>51</sup>	-22 54 <sup>51</sup>	-22 50 <sup>50</sup>	-22 47 <sup>50</sup>	19 21
42	22 12 <sup>51</sup>	22 9 <sup>51</sup>	22 6 <sup>51</sup>	22 3 <sup>50</sup>	22 0 <sup>51</sup>	21 57 <sup>51</sup>	18
45	21 21 <sup>51</sup>	21 18 <sup>51</sup>	21 15 <sup>51</sup>	21 13 <sup>50</sup>	21 9 <sup>50</sup>	21 6 <sup>51</sup>	15
48	20 30 <sup>51</sup>	20 27 <sup>51</sup>	20 24 <sup>51</sup>	20 22 <sup>51</sup>	20 19 <sup>51</sup>	20 16 <sup>50</sup>	12
51	19 39 <sup>52</sup>	19 36 <sup>52</sup>	19 33 <sup>51</sup>	19 31 <sup>52</sup>	19 28 <sup>51</sup>	19 25 <sup>51</sup>	9
4 54	-18 47 <sup>52</sup>	-18 44 <sup>51</sup>	-18 42 <sup>52</sup>	-18 39 <sup>51</sup>	-18 37 <sup>52</sup>	-18 34 <sup>51</sup>	19 6
4 57	17 55 <sup>52</sup>	17 53 <sup>52</sup>	17 50 <sup>52</sup>	17 48 <sup>51</sup>	17 45 <sup>51</sup>	17 43 <sup>52</sup>	3
5 0	17 3 <sup>52</sup>	17 1 <sup>52</sup>	16 58 <sup>51</sup>	16 56 <sup>52</sup>	16 54 <sup>51</sup>	16 51 <sup>51</sup>	19 0
3	16 11 <sup>52</sup>	16 9 <sup>52</sup>	16 7 <sup>52</sup>	16 4 <sup>52</sup>	16 2 <sup>52</sup>	16 0 <sup>52</sup>	18 57
6	15 19 <sup>52</sup>	15 17 <sup>53</sup>	15 15 <sup>53</sup>	15 12 <sup>52</sup>	15 10 <sup>52</sup>	15 8 <sup>52</sup>	54
5 9	-14 27 <sup>53</sup>	-14 24 <sup>52</sup>	-14 22 <sup>52</sup>	-14 20 <sup>52</sup>	-14 18 <sup>52</sup>	-14 16 <sup>52</sup>	18 51
12	13 34 <sup>53</sup>	13 32 <sup>53</sup>	13 30 <sup>53</sup>	13 28 <sup>52</sup>	13 26 <sup>52</sup>	13 24 <sup>52</sup>	48
15	12 41 <sup>53</sup>	12 39 <sup>53</sup>	12 37 <sup>52</sup>	12 36 <sup>53</sup>	12 34 <sup>53</sup>	12 32 <sup>52</sup>	45
18	11 48 <sup>53</sup>	11 46 <sup>53</sup>	11 45 <sup>53</sup>	11 43 <sup>53</sup>	11 41 <sup>52</sup>	11 40 <sup>53</sup>	42
21	10 55 <sup>53</sup>	10 53 <sup>53</sup>	10 52 <sup>53</sup>	10 50 <sup>52</sup>	10 49 <sup>53</sup>	10 47 <sup>52</sup>	39
5 24	-10 2 <sup>53</sup>	-10 0 <sup>53</sup>	-9 59 <sup>53</sup>	-9 58 <sup>53</sup>	-9 56 <sup>52</sup>	-9 55 <sup>53</sup>	18 36
27	9 9 <sup>53</sup>	9 7 <sup>53</sup>	9 6 <sup>53</sup>	9 5 <sup>53</sup>	9 4 <sup>53</sup>	9 2 <sup>52</sup>	33
30	8 16 <sup>54</sup>	8 14 <sup>53</sup>	8 13 <sup>53</sup>	8 12 <sup>53</sup>	8 11 <sup>53</sup>	8 10 <sup>53</sup>	30
33	7 22 <sup>54</sup>	7 21 <sup>53</sup>	7 20 <sup>53</sup>	7 19 <sup>53</sup>	7 18 <sup>53</sup>	7 17 <sup>53</sup>	27
36	6 28 <sup>54</sup>	6 28 <sup>54</sup>	6 27 <sup>54</sup>	6 26 <sup>53</sup>	6 25 <sup>53</sup>	6 24 <sup>53</sup>	24
5 39	-5 35 <sup>54</sup>	-5 34 <sup>53</sup>	-5 33 <sup>53</sup>	-5 33 <sup>53</sup>	-5 32 <sup>53</sup>	-5 31 <sup>53</sup>	18 21
42	4 41 <sup>53</sup>	4 41 <sup>53</sup>	4 40 <sup>53</sup>	4 40 <sup>54</sup>	4 39 <sup>53</sup>	4 38 <sup>53</sup>	18
45	3 48 <sup>54</sup>	3 48 <sup>54</sup>	3 47 <sup>54</sup>	3 46 <sup>53</sup>	3 46 <sup>53</sup>	3 45 <sup>53</sup>	15
48	2 54 <sup>54</sup>	2 54 <sup>54</sup>	2 53 <sup>53</sup>	2 53 <sup>53</sup>	2 53 <sup>53</sup>	2 52 <sup>53</sup>	12
51	2 0 <sup>53</sup>	2 0 <sup>54</sup>	2 0 <sup>53</sup>	2 0 <sup>54</sup>	2 0 <sup>54</sup>	1 59 <sup>53</sup>	9
5 54	-1 7 <sup>54</sup>	-1 6 <sup>53</sup>	-1 6 <sup>53</sup>	-1 6 <sup>53</sup>	-1 6 <sup>53</sup>	-1 6 <sup>53</sup>	18 6
5 57	-0 13 <sup>54</sup>	-0 13 <sup>54</sup>	-0 13 <sup>53</sup>	-0 13 <sup>53</sup>	-0 13 <sup>53</sup>	-0 13 <sup>53</sup>	3
6 0	+0 41 <sup>53</sup>	+0 41 <sup>53</sup>	+0 40 <sup>53</sup>	+0 40 <sup>53</sup>	+0 40 <sup>53</sup>	+0 40 <sup>53</sup>	18 0
3	1 34 <sup>54</sup>	1 34 <sup>54</sup>	1 34 <sup>53</sup>	1 33 <sup>54</sup>	1 33 <sup>53</sup>	1 33 <sup>53</sup>	17 57
6	2 28 <sup>54</sup>	2 28 <sup>53</sup>	2 27 <sup>53</sup>	2 27 <sup>53</sup>	2 26 <sup>53</sup>	2 26 <sup>53</sup>	54
6 9	+3 22 <sup>53</sup>	+3 21 <sup>54</sup>	+3 20 <sup>54</sup>	+3 20 <sup>53</sup>	+3 19 <sup>53</sup>	+3 19 <sup>53</sup>	17 51
12	4 15 <sup>54</sup>	4 15 <sup>53</sup>	4 14 <sup>54</sup>	4 13 <sup>53</sup>	4 12 <sup>53</sup>	4 12 <sup>52</sup>	48
15	5 9 <sup>54</sup>	5 8 <sup>53</sup>	5 7 <sup>53</sup>	5 6 <sup>53</sup>	5 5 <sup>53</sup>	5 4 <sup>53</sup>	45
18	6 2 <sup>54</sup>	6 1 <sup>53</sup>	6 0 <sup>53</sup>	5 59 <sup>53</sup>	5 58 <sup>53</sup>	5 57 <sup>53</sup>	42
21	6 56 <sup>54</sup>	6 54 <sup>54</sup>	6 53 <sup>53</sup>	6 52 <sup>53</sup>	6 51 <sup>53</sup>	6 50 <sup>53</sup>	39
6 24	+7 49 <sup>53</sup>	+7 48 <sup>53</sup>	+7 46 <sup>53</sup>	+7 45 <sup>53</sup>	+7 44 <sup>53</sup>	+7 43 <sup>52</sup>	17 36
27	8 42 <sup>53</sup>	8 41 <sup>53</sup>	8 39 <sup>53</sup>	8 38 <sup>53</sup>	8 37 <sup>52</sup>	8 35 <sup>52</sup>	33
30	9 35 <sup>53</sup>	9 34 <sup>53</sup>	9 32 <sup>53</sup>	9 31 <sup>52</sup>	9 29 <sup>52</sup>	9 28 <sup>52</sup>	30
33	10 28 <sup>53</sup>	10 27 <sup>52</sup>	10 25 <sup>53</sup>	10 23 <sup>52</sup>	10 22 <sup>52</sup>	10 20 <sup>52</sup>	27
36	11 21 <sup>53</sup>	11 19 <sup>53</sup>	11 18 <sup>52</sup>	11 16 <sup>52</sup>	11 14 <sup>52</sup>	11 12 <sup>52</sup>	24
6 39	+12 14 <sup>53</sup>	+12 12 <sup>53</sup>	+12 10 <sup>53</sup>	+12 8 <sup>53</sup>	+12 6 <sup>53</sup>	+12 5 <sup>52</sup>	17 21
42	13 7 <sup>52</sup>	13 5 <sup>52</sup>	13 3 <sup>52</sup>	13 1 <sup>52</sup>	12 59 <sup>52</sup>	12 57 <sup>51</sup>	18
45	13 59 <sup>53</sup>	13 57 <sup>52</sup>	13 55 <sup>52</sup>	13 53 <sup>52</sup>	13 51 <sup>51</sup>	13 48 <sup>52</sup>	15
48	14 52 <sup>52</sup>	14 49 <sup>52</sup>	14 47 <sup>52</sup>	14 45 <sup>52</sup>	14 42 <sup>52</sup>	14 40 <sup>52</sup>	12
51	15 44 <sup>52</sup>	15 41 <sup>52</sup>	15 39 <sup>52</sup>	15 37 <sup>51</sup>	15 34 <sup>52</sup>	15 32 <sup>51</sup>	9
6 54	+16 36 <sup>52</sup>	+16 33 <sup>52</sup>	+16 31 <sup>51</sup>	+16 28 <sup>52</sup>	+16 26 <sup>51</sup>	+16 23 <sup>51</sup>	17 6
6 57	17 28 <sup>51</sup>	17 25 <sup>51</sup>	17 22 <sup>52</sup>	17 20 <sup>51</sup>	17 17 <sup>51</sup>	17 14 <sup>51</sup>	3
7 0	18 19 <sup>52</sup>	18 16 <sup>52</sup>	18 14 <sup>51</sup>	18 11 <sup>51</sup>	18 8 <sup>51</sup>	18 5 <sup>51</sup>	17 0
3	19 11 <sup>52</sup>	19 8 <sup>51</sup>	19 5 <sup>51</sup>	19 2 <sup>51</sup>	18 59 <sup>51</sup>	18 56 <sup>51</sup>	16 57
7 6	+20 2 <sup>51</sup>	+19 59 <sup>51</sup>	+19 56 <sup>51</sup>	+19 53 <sup>51</sup>	+19 50 <sup>51</sup>	+19 47 <sup>51</sup>	16 54

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Decl. H. A.		88° 51' 40''	88° 51' 50''	88° 52' 0''	88° 52' 10''	88° 52' 20''	88° 52' 30''	Decl. H. A.
h m		' "	' "	' "	' "	' "	' "	h m
7 6		+20 2 51	+19 59 51	+19 56 51	+19 53 51	+19 50 51	+19 47 50	
9		20 53 51	20 50 51	20 47 50	20 44 50	20 41 50	20 37 51	16 54
12		21 44 51	21 41 50	21 37 51	21 34 50	21 31 50	21 28 51	51
15		22 35 50	22 31 50	22 28 50	22 24 50	22 21 50	22 18 49	48
18		23 25 50	23 21 50	23 18 50	23 14 50	23 11 50	23 7 50	45
7 21		+24 15 50	+24 11 50	+24 8 49	+24 4 50	+24 1 49	+23 57 49	42
24		25 5 50	25 1 50	24 57 50	24 54 49	24 50 49	24 46 49	16 39
27		25 55 49	25 51 49	25 47 49	25 43 49	25 39 49	25 35 49	36
30		26 44 49	26 40 50	26 36 49	26 32 49	26 28 49	26 24 48	33
33		27 33 49	27 30 48	27 25 48	27 21 48	27 17 48	27 12 49	30
7 36		+28 22 48	+28 18 48	+28 13 49	+28 9 48	+28 5 48	+28 1 48	27
39		29 10 48	29 6 48	29 2 48	28 57 48	28 53 48	28 49 48	16 24
42		29 58 48	29 54 48	29 50 47	29 45 48	29 41 47	29 36 47	21
45		30 46 48	30 42 47	30 37 47	30 33 48	30 28 47	30 23 47	18
48		31 34 47	31 29 47	31 24 47	31 20 47	31 15 47	31 10 47	15
7 51		+32 21 47	+32 16 47	+32 11 47	+32 7 46	+32 2 46	+31 57 46	12
54		33 8 47	33 3 47	32 58 46	32 53 46	32 48 46	32 43 46	16 9
7 57		33 55 46	33 50 46	33 44 46	33 39 46	33 34 46	33 29 46	6
8 0		34 41 46	34 36 45	34 30 46	34 25 46	34 20 46	34 15 45	3
3		35 27 45	35 21 46	35 16 45	35 11 45	35 6 45	35 0 45	16 0
8 6		+36 12 45	+36 7 45	+36 1 45	+35 56 45	+35 51 44	+35 45 45	15 57
9		36 57 45	36 52 44	36 46 45	36 41 44	36 35 44	36 30 44	15 54
12		37 42 44	37 36 44	37 31 44	37 25 44	37 19 44	37 14 44	51
15		38 26 44	38 20 44	38 15 44	38 9 44	38 3 44	37 58 44	48
18		39 10 44	39 4 44	38 58 44	38 53 43	38 47 43	38 41 43	45
8 21		+39 54 43	+39 48 43	+39 42 43	+39 36 43	+39 30 43	+39 24 43	42
24		40 37 43	40 31 42	40 25 42	40 19 42	40 13 42	40 7 42	15 39
27		41 20 42	41 13 42	41 7 42	41 1 42	40 55 42	40 49 42	36
30		42 2 42	41 55 42	41 49 42	41 43 42	41 37 42	41 31 42	33
33		42 44 41	42 37 42	42 31 41	42 25 41	42 18 41	42 12 41	30
8 36		+43 25 41	+43 19 41	+43 12 41	+43 6 41	+42 59 41	+42 53 40	27
39		44 6 40	44 0 40	43 53 40	43 47 40	43 40 40	43 33 40	15 24
42		44 46 40	44 40 40	44 33 40	44 27 40	44 20 40	44 13 40	21
45		45 26 40	45 20 39	45 13 39	45 7 39	45 0 39	44 53 39	18
48		46 6 39	45 59 39	45 52 39	45 46 39	45 39 39	45 32 39	15
8 51		+46 45 39	+46 38 39	+46 31 39	+46 25 38	+46 18 38	+46 11 38	12
54		47 24 38	47 17 38	47 10 38	47 3 38	46 56 38	46 49 38	15 9
8 57		48 2 38	47 55 38	47 48 37	47 41 37	47 34 37	47 27 37	6
9 0		48 40 37	48 33 37	48 25 37	48 18 37	48 11 37	48 4 37	3
3		49 17 37	49 10 36	49 2 37	48 55 36	48 48 36	48 41 36	15 0
9 6		+49 54 36	+49 46 36	+49 39 36	+49 31 36	+49 24 36	+49 17 36	14 57
9		50 30 35	50 22 36	50 15 35	50 7 36	50 0 35	49 53 35	14 54
12		51 5 35	50 58 35	50 50 35	50 43 35	50 35 35	50 28 34	51
15		51 40 35	51 33 34	51 25 35	51 18 34	51 10 34	51 2 35	48
18		52 15 34	52 7 34	52 0 34	51 52 34	51 44 34	51 37 33	45
9 21		+52 49 34	+52 41 34	+52 34 33	+52 26 33	+52 18 33	+52 10 33	42
24		53 23 33	53 15 33	53 7 33	52 59 33	52 51 33	52 43 33	14 39
27		53 56 32	53 48 32	53 40 32	53 32 32	53 24 32	53 16 32	36
30		54 28 32	54 20 32	54 12 32	54 4 32	53 56 32	53 48 32	33
33		55 0 31	54 52 31	54 44 31	54 36 31	54 28 31	54 19 31	30
9 36		+55 31 31	+55 23 31	+55 15 30	+55 7 30	+54 59 30	+54 50 31	27
39		56 2 30	55 54 30	55 45 30	55 37 30	55 29 30	55 21 30	14 24
42		56 32 30	56 24 29	56 15 30	56 7 30	55 59 29	55 51 29	21
45		57 2 29	56 53 29	56 45 29	56 37 29	56 28 29	56 20 29	18
48		57 31 28	57 22 29	57 14 28	57 6 28	56 57 28	56 49 28	15
9 51		+57 59 28	+57 51 28	+57 42 28	+57 34 27	+57 25 28	+57 17 27	12
54		58 27 27	58 19 27	58 10 27	58 1 27	57 53 27	57 44 27	14 9
9 57		58 54 27	58 46 26	58 37 27	58 28 27	58 20 27	58 11 27	6
10 0		59 21 26	59 12 26	59 4 26	58 55 26	58 46 26	58 37 26	3
10 3		+59 47 26	+59 38 26	+59 30 26	+59 21 26	+59 12 26	+59 3 26	14 0
								13 57

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1917.

Decl. H. A.		88° 51' 40"	88° 51' 50"	88° 52' 0"	88° 52' 10"	88° 52' 20"	88° 52' 30"	Decl. H. A.	
h	m	' "	' "	' "	' "	' "	' "	h	m
10	3	+59 47	+59 38	+59 30	+59 21	+59 12	+59 3	13	57
	6	60 13	60 4	59 55	59 46	59 37	59 28		54
	9	60 37	60 28	60 20	60 11	60 2	59 53		51
	12	61 2	60 53	60 44	60 35	60 26	60 17		48
	15	61 25	61 16	61 7	60 58	60 49	60 40		45
10	18	+61 48	+61 39	+61 30	+61 21	+61 12	+61 3	13	42
	21	62 11	62 2	61 52	61 43	61 34	61 25		39
	24	62 32	62 23	62 14	62 5	61 56	61 46		36
	27	62 53	62 44	62 35	62 26	62 17	62 7		33
	30	63 14	63 5	62 55	63 46	62 37	62 28		30
10	33	+63 34	+63 24	+63 15	+63 6	+62 57	+62 47	13	27
	36	63 53	63 44	63 34	63 25	63 16	63 6		24
	39	64 12	64 2	63 53	63 43	63 34	63 24		21
	42	64 29	64 20	64 11	64 1	63 52	63 42		18
	45	64 47	64 37	64 28	64 18	64 9	63 59		15
10	48	+65 3	+64 54	+64 44	+64 35	+64 25	+64 16	13	12
	51	65 19	65 10	65 0	64 51	64 41	64 31		9
	54	65 34	65 25	65 15	65 6	64 56	64 46		6
10	57	65 49	65 40	65 30	65 20	65 11	65 1		3
11	0	66 3	65 54	65 44	65 34	65 24	65 13	13	0
11	3	+66 16	+66 7	+65 57	+65 47	+65 38	+65 28	12	57
	6	66 29	66 19	66 9	66 0	65 50	65 40		54
	9	66 41	66 31	66 21	66 12	66 2	65 52		51
	12	66 52	66 42	66 33	66 23	66 13	66 3		48
	15	67 3	66 53	66 43	66 33	66 24	66 14		45
11	18	+67 13	+67 3	+66 53	+66 43	+66 33	+66 24	12	42
	21	67 22	67 12	67 2	66 52	66 42	66 33		39
	24	67 30	67 20	67 11	67 1	66 51	66 41		36
	27	67 38	67 28	67 19	67 9	66 59	66 49		33
	30	67 46	67 36	67 26	67 16	67 6	66 56		30
11	33	+67 52	+67 42	+67 32	+67 22	+67 12	+67 2	12	27
	36	67 58	67 48	67 38	67 28	67 18	67 8		24
	39	68 3	67 53	67 43	67 33	67 23	67 13		21
	42	68 8	67 58	67 48	67 38	67 28	67 18		18
	45	68 11	68 1	67 51	67 41	67 31	67 21		15
11	48	+68 14	+68 4	+67 54	+67 44	+67 34	+67 24	12	12
	51	68 17	68 7	67 57	67 47	67 37	67 27		9
	54	68 19	68 9	67 59	67 49	67 39	67 29		6
11	57	68 20	68 10	68 0	67 50	67 40	67 30		3
12	0	+68 20	+68 10	+68 0	+67 50	+67 40	+67 30	12	0

TABLE Ia.

Table I has been computed for an altitude of 45°. For other altitudes, corrections taken from the following table may be applied when the desired degree of accuracy requires it.

Altitude. H. A.		10°	20°	30°	40°	50°	60°	70°	Altitude. H. A.	
h	h	"	"	"	"	"	"	"	h	h
0	12	0	0	0	0	0	0	0	12	24
1	11	- 2	- 2	- 1	0	0	+ 2	+ 5	13	23
2	10	8	7	4	- 2	+ 2	8	18	14	22
3	9	17	13	9	3	4	15	36	15	21
4	8	25	20	13	5	6	23	53	16	20
5	7	32	24	16	6	7	28	66	17	19
6	6	-34	-26	-17	-7	+8	+30	+71	18	18

## SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

Side- real.	0 <sup>h</sup>	1 <sup>h</sup>	2 <sup>h</sup>	3 <sup>h</sup>	4 <sup>h</sup>	5 <sup>h</sup>	6 <sup>h</sup>	7 <sup>h</sup>	For Seconds.
m	m s	m s	m s	m s	m s	m s	m s	m s	s s
0	0 0.000	0 9.830	0 19.659	0 29.489	0 39.318	0 49.148	0 58.977	1 8.807	0 0.000
1	0 0.164	0 9.993	0 19.823	0 29.653	0 39.482	0 49.312	0 59.141	1 8.971	1 0.003
2	0 0.328	0 10.157	0 19.987	0 29.816	0 39.646	0 49.475	0 59.305	1 9.135	2 0.005
3	0 0.491	0 10.321	0 20.151	0 29.980	0 39.810	0 49.639	0 59.469	1 9.298	3 0.008
4	0 0.655	0 10.485	0 20.314	0 30.144	0 39.974	0 49.803	0 59.633	1 9.462	4 0.011
5	0 0.819	0 10.649	0 20.478	0 30.308	0 40.137	0 49.967	0 59.796	1 9.626	5 0.014
6	0 0.983	0 10.813	0 20.642	0 30.472	0 40.301	0 50.131	0 59.960	1 9.790	6 0.016
7	0 1.147	0 10.976	0 20.806	0 30.635	0 40.465	0 50.295	1 0.124	1 9.954	7 0.019
8	0 1.311	0 11.140	0 20.970	0 30.799	0 40.629	0 50.458	1 0.288	1 10.118	8 0.022
9	0 1.474	0 11.304	0 21.134	0 30.963	0 40.793	0 50.622	1 0.452	1 10.281	9 0.025
10	0 1.638	0 11.468	0 21.297	0 31.127	0 40.956	0 50.786	1 0.616	1 10.445	10 0.027
11	0 1.802	0 11.632	0 21.461	0 31.291	0 41.120	0 50.950	1 0.779	1 10.609	11 0.030
12	0 1.966	0 11.795	0 21.625	0 31.455	0 41.284	0 51.114	1 0.943	1 10.773	12 0.033
13	0 2.130	0 11.959	0 21.789	0 31.618	0 41.448	0 51.278	1 1.107	1 10.937	13 0.035
14	0 2.294	0 12.123	0 21.953	0 31.782	0 41.612	0 51.441	1 1.271	1 11.100	14 0.038
15	0 2.457	0 12.287	0 22.117	0 31.946	0 41.776	0 51.605	1 1.435	1 11.264	15 0.041
16	0 2.621	0 12.451	0 22.280	0 32.110	0 41.939	0 51.769	1 1.599	1 11.428	16 0.044
17	0 2.785	0 12.615	0 22.444	0 32.274	0 42.103	0 51.933	1 1.762	1 11.592	17 0.046
18	0 2.949	0 12.778	0 22.608	0 32.438	0 42.267	0 52.097	1 1.926	1 11.756	18 0.049
19	0 3.113	0 12.942	0 22.772	0 32.601	0 42.431	0 52.260	1 2.090	1 11.920	19 0.052
20	0 3.277	0 13.106	0 22.936	0 32.765	0 42.595	0 52.424	1 2.254	1 12.083	20 0.055
21	0 3.440	0 13.270	0 23.099	0 32.929	0 42.759	0 52.588	1 2.418	1 12.247	21 0.057
22	0 3.604	0 13.434	0 23.263	0 33.093	0 42.922	0 52.752	1 2.582	1 12.411	22 0.060
23	0 3.768	0 13.598	0 23.427	0 33.257	0 43.086	0 52.916	1 2.745	1 12.575	23 0.063
24	0 3.932	0 13.761	0 23.591	0 33.420	0 43.250	0 53.080	1 2.909	1 12.739	24 0.066
25	0 4.096	0 13.925	0 23.755	0 33.584	0 43.414	0 53.243	1 3.073	1 12.903	25 0.068
26	0 4.259	0 14.089	0 23.919	0 33.748	0 43.578	0 53.407	1 3.237	1 13.066	26 0.071
27	0 4.423	0 14.253	0 24.082	0 33.912	0 43.742	0 53.571	1 3.401	1 13.230	27 0.074
28	0 4.587	0 14.417	0 24.246	0 34.076	0 43.905	0 53.735	1 3.564	1 13.394	28 0.076
29	0 4.751	0 14.581	0 24.410	0 34.240	0 44.069	0 53.899	1 3.728	1 13.558	29 0.079
30	0 4.915	0 14.744	0 24.574	0 34.403	0 44.233	0 54.063	1 3.892	1 13.722	30 0.082
31	0 5.079	0 14.908	0 24.738	0 34.567	0 44.397	0 54.226	1 4.056	1 13.886	31 0.085
32	0 5.242	0 15.072	0 24.902	0 34.731	0 44.561	0 54.390	1 4.220	1 14.049	32 0.087
33	0 5.406	0 15.236	0 25.065	0 34.895	0 44.724	0 54.554	1 4.384	1 14.213	33 0.090
34	0 5.570	0 15.400	0 25.229	0 35.059	0 44.888	0 54.718	1 4.547	1 14.377	34 0.093
35	0 5.734	0 15.563	0 25.393	0 35.223	0 45.052	0 54.882	1 4.711	1 14.541	35 0.096
36	0 5.898	0 15.727	0 25.557	0 35.386	0 45.216	0 55.046	1 4.875	1 14.705	36 0.098
37	0 6.062	0 15.891	0 25.721	0 35.550	0 45.380	0 55.209	1 5.039	1 14.868	37 0.101
38	0 6.225	0 16.055	0 25.885	0 35.714	0 45.544	0 55.373	1 5.203	1 15.032	38 0.104
39	0 6.389	0 16.219	0 26.048	0 35.878	0 45.707	0 55.537	1 5.367	1 15.196	39 0.106
40	0 6.553	0 16.383	0 26.212	0 36.042	0 45.871	0 55.701	1 5.530	1 15.360	40 0.109
41	0 6.717	0 16.546	0 26.376	0 36.206	0 46.035	0 55.865	1 5.694	1 15.524	41 0.112
42	0 6.881	0 16.710	0 26.540	0 36.369	0 46.199	0 56.028	1 5.858	1 15.688	42 0.115
43	0 7.045	0 16.874	0 26.704	0 36.533	0 46.363	0 56.192	1 6.022	1 15.851	43 0.117
44	0 7.208	0 17.038	0 26.867	0 36.697	0 46.527	0 56.356	1 6.186	1 16.015	44 0.120
45	0 7.372	0 17.202	0 27.031	0 36.861	0 46.690	0 56.520	1 6.350	1 16.179	45 0.123
46	0 7.536	0 17.366	0 27.195	0 37.025	0 46.854	0 56.684	1 6.513	1 16.343	46 0.126
47	0 7.700	0 17.529	0 27.359	0 37.188	0 47.018	0 56.848	1 6.677	1 16.507	47 0.128
48	0 7.864	0 17.693	0 27.523	0 37.352	0 47.182	0 57.011	1 6.841	1 16.671	48 0.131
49	0 8.027	0 17.857	0 27.687	0 37.516	0 47.346	0 57.175	1 7.005	1 16.834	49 0.134
50	0 8.191	0 18.021	0 27.850	0 37.680	0 47.510	0 57.339	1 7.169	1 16.998	50 0.137
51	0 8.355	0 18.185	0 28.014	0 37.844	0 47.673	0 57.503	1 7.332	1 17.162	51 0.139
52	0 8.519	0 18.349	0 28.178	0 38.008	0 47.837	0 57.667	1 7.496	1 17.326	52 0.142
53	0 8.683	0 18.512	0 28.342	0 38.171	0 48.001	0 57.831	1 7.660	1 17.490	53 0.145
54	0 8.847	0 18.676	0 28.506	0 38.335	0 48.165	0 57.994	1 7.824	1 17.654	54 0.147
55	0 9.010	0 18.840	0 28.670	0 38.499	0 48.329	0 58.158	1 7.988	1 17.817	55 0.150
56	0 9.174	0 19.004	0 28.833	0 38.663	0 48.492	0 58.322	1 8.152	1 17.981	56 0.153
57	0 9.338	0 19.168	0 28.997	0 38.827	0 48.656	0 58.486	1 8.315	1 18.145	57 0.156
58	0 9.502	0 19.331	0 29.161	0 38.991	0 48.820	0 58.650	1 8.479	1 18.309	58 0.158
59	0 9.666	0 19.495	0 29.325	0 39.154	0 48.984	0 58.814	1 8.643	1 18.473	59 0.161

## SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

Side- real.	8 <sup>h</sup>	9 <sup>h</sup>	10 <sup>h</sup>	11 <sup>h</sup>	12 <sup>h</sup>	13 <sup>h</sup>	14 <sup>h</sup>	15 <sup>h</sup>	For Seconds.
m	m s	m s	m s	m s	m s	m s	m s	m s	s s
0	1 18.636	1 28.466	1 38.296	1 48.125	1 57.955	2 7.784	2 17.614	2 27.443	0 0.000
1	1 18.800	1 28.630	1 38.459	1 48.289	1 58.119	2 7.948	2 17.778	2 27.607	1 0.003
2	1 18.964	1 28.794	1 38.623	1 48.453	1 58.282	2 8.112	2 17.941	2 27.771	2 0.005
3	1 19.128	1 28.958	1 38.787	1 48.617	1 58.446	2 8.276	2 18.105	2 27.935	3 0.008
4	1 19.292	1 29.121	1 38.951	1 48.780	1 58.610	2 8.440	2 18.269	2 28.099	4 0.011
5	1 19.456	1 29.285	1 39.115	1 48.944	1 58.774	2 8.603	2 18.433	2 28.263	5 0.014
6	1 19.619	1 29.449	1 39.279	1 49.108	1 58.938	2 8.767	2 18.597	2 28.426	6 0.016
7	1 19.783	1 29.613	1 39.442	1 49.272	1 59.101	2 8.931	2 18.761	2 28.590	7 0.019
8	1 19.947	1 29.777	1 39.606	1 49.436	1 59.265	2 9.095	2 18.924	2 28.754	8 0.022
9	1 20.111	1 29.940	1 39.770	1 49.600	1 59.429	2 9.259	2 19.088	2 28.918	9 0.025
10	1 20.275	1 30.104	1 39.934	1 49.763	1 59.593	2 9.423	2 19.252	2 29.082	10 0.027
11	1 20.439	1 30.268	1 40.098	1 49.927	1 59.757	2 9.586	2 19.416	2 29.245	11 0.030
12	1 20.602	1 30.432	1 40.261	1 50.091	1 59.921	2 9.750	2 19.580	2 29.409	12 0.033
13	1 20.766	1 30.596	1 40.425	1 50.255	2 0.084	2 9.914	2 19.744	2 29.573	13 0.035
14	1 20.930	1 30.760	1 40.589	1 50.419	2 0.248	2 10.078	2 19.907	2 29.737	14 0.038
15	1 21.094	1 30.923	1 40.753	1 50.583	2 0.412	2 10.242	2 20.071	2 29.901	15 0.041
16	1 21.258	1 31.087	1 40.917	1 50.746	2 0.576	2 10.405	2 20.235	2 30.065	16 0.044
17	1 21.422	1 31.251	1 41.081	1 50.910	2 0.740	2 10.569	2 20.399	2 30.228	17 0.046
18	1 21.585	1 31.415	1 41.244	1 51.074	2 0.904	2 10.733	2 20.563	2 30.392	18 0.049
19	1 21.749	1 31.579	1 41.408	1 51.238	2 1.067	2 10.897	2 20.727	2 30.556	19 0.052
20	1 21.913	1 31.743	1 41.572	1 51.402	2 1.231	2 11.061	2 20.890	2 30.720	20 0.055
21	1 22.077	1 31.906	1 41.736	1 51.565	2 1.395	2 11.225	2 21.054	2 30.884	21 0.057
22	1 22.241	1 32.070	1 41.900	1 51.729	2 1.559	2 11.388	2 21.218	2 31.048	22 0.060
23	1 22.404	1 32.234	1 42.064	1 51.893	2 1.723	2 11.552	2 21.382	2 31.211	23 0.063
24	1 22.568	1 32.398	1 42.227	1 52.057	2 1.887	2 11.716	2 21.546	2 31.375	24 0.066
25	1 22.732	1 32.562	1 42.391	1 52.221	2 2.050	2 11.880	2 21.709	2 31.539	25 0.068
26	1 22.896	1 32.726	1 42.555	1 52.385	2 2.214	2 12.044	2 21.873	2 31.703	26 0.071
27	1 23.060	1 32.889	1 42.719	1 52.548	2 2.378	2 12.208	2 22.037	2 31.867	27 0.074
28	1 23.224	1 33.053	1 42.883	1 52.712	2 2.542	2 12.371	2 22.201	2 32.031	28 0.076
29	1 23.387	1 33.217	1 43.047	1 52.876	2 2.706	2 12.535	2 22.365	2 32.194	29 0.079
30	1 23.551	1 33.381	1 43.210	1 53.040	2 2.869	2 12.699	2 22.529	2 32.358	30 0.082
31	1 23.715	1 33.545	1 43.374	1 53.204	2 3.033	2 12.863	2 22.692	2 32.522	31 0.085
32	1 23.879	1 33.708	1 43.538	1 53.368	2 3.197	2 13.027	2 22.856	2 32.686	32 0.087
33	1 24.043	1 33.872	1 43.702	1 53.531	2 3.361	2 13.191	2 23.020	2 32.850	33 0.090
34	1 24.207	1 34.036	1 43.866	1 53.695	2 3.525	2 13.354	2 23.184	2 33.013	34 0.093
35	1 24.370	1 34.200	1 44.029	1 53.859	2 3.689	2 13.518	2 23.348	2 33.177	35 0.096
36	1 24.534	1 34.364	1 44.193	1 54.023	2 3.852	2 13.682	2 23.512	2 33.341	36 0.098
37	1 24.698	1 34.528	1 44.357	1 54.187	2 4.016	2 13.846	2 23.675	2 33.505	37 0.101
38	1 24.862	1 34.691	1 44.521	1 54.351	2 4.180	2 14.010	2 23.839	2 33.669	38 0.104
39	1 25.026	1 34.855	1 44.685	1 54.514	2 4.344	2 14.173	2 24.003	2 33.833	39 0.106
40	1 25.190	1 35.019	1 44.849	1 54.678	2 4.508	2 14.337	2 24.167	2 33.996	40 0.109
41	1 25.353	1 35.183	1 45.012	1 54.842	2 4.672	2 14.501	2 24.331	2 34.160	41 0.112
42	1 25.517	1 35.347	1 45.176	1 55.006	2 4.835	2 14.665	2 24.495	2 34.324	42 0.115
43	1 25.681	1 35.511	1 45.340	1 55.170	2 4.999	2 14.829	2 24.658	2 34.488	43 0.117
44	1 25.845	1 35.674	1 45.504	1 55.333	2 5.163	2 14.993	2 24.822	2 34.652	44 0.120
45	1 26.009	1 35.838	1 45.668	1 55.497	2 5.327	2 15.156	2 24.986	2 34.816	45 0.123
46	1 26.172	1 36.002	1 45.832	1 55.661	2 5.491	2 15.320	2 25.150	2 34.979	46 0.126
47	1 26.336	1 36.166	1 45.995	1 55.825	2 5.655	2 15.484	2 25.314	2 35.143	47 0.128
48	1 26.500	1 36.330	1 46.159	1 55.989	2 5.818	2 15.648	2 25.477	2 35.307	48 0.131
49	1 26.664	1 36.493	1 46.323	1 56.153	2 5.982	2 15.812	2 25.641	2 35.471	49 0.134
50	1 26.828	1 36.657	1 46.487	1 56.316	2 6.146	2 15.976	2 25.805	2 35.635	50 0.137
51	1 26.992	1 36.821	1 46.651	1 56.480	2 6.310	2 16.139	2 25.969	2 35.798	51 0.139
52	1 27.155	1 36.985	1 46.815	1 56.644	2 6.474	2 16.303	2 26.133	2 35.962	52 0.142
53	1 27.319	1 37.149	1 46.978	1 56.808	2 6.637	2 16.467	2 26.297	2 36.126	53 0.145
54	1 27.483	1 37.313	1 47.142	1 56.972	2 6.801	2 16.631	2 26.460	2 36.290	54 0.147
55	1 27.647	1 37.476	1 47.306	1 57.136	2 6.965	2 16.795	2 26.624	2 36.454	55 0.150
56	1 27.811	1 37.640	1 47.470	1 57.299	2 7.129	2 16.959	2 26.788	2 36.618	56 0.153
57	1 27.975	1 37.804	1 47.634	1 57.463	2 7.293	2 17.122	2 26.952	2 36.781	57 0.156
58	1 28.138	1 37.968	1 47.797	1 57.627	2 7.457	2 17.286	2 27.116	2 36.945	58 0.158
59	1 28.302	1 38.132	1 47.961	1 57.791	2 7.620	2 17.450	2 27.280	2 37.109	59 0.160

## SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.

Side- real.	16 <sup>h</sup>	17 <sup>h</sup>	18 <sup>h</sup>	19 <sup>h</sup>	20 <sup>h</sup>	21 <sup>h</sup>	22 <sup>h</sup>	23 <sup>h</sup>	For Seconds.
m	m s	m s	m s	m s	m s	m s	m s	m s	s s
0	2 37.273	2 47.102	2 56.932	3 6.762	3 16.591	3 26.421	3 36.250	3 46.080	0 0.000
1	2 37.437	2 47.266	2 57.096	3 6.925	3 16.755	3 26.585	3 36.414	3 46.244	1 0.003
2	2 37.601	2 47.430	2 57.260	3 7.089	3 16.919	3 26.748	3 36.578	3 46.407	2 0.005
3	2 37.764	2 47.594	2 57.424	3 7.253	3 17.083	3 26.912	3 36.742	3 46.571	3 0.008
4	2 37.928	2 47.758	2 57.587	3 7.417	3 17.246	3 27.076	3 36.906	3 46.735	4 0.011
5	2 38.092	2 47.922	2 57.751	3 7.581	3 17.410	3 27.240	3 37.069	3 46.899	5 0.014
6	2 38.256	2 48.085	2 57.915	3 7.745	3 17.574	3 27.404	3 37.233	3 47.063	6 0.016
7	2 38.420	2 48.249	2 58.079	3 7.908	3 17.738	3 27.568	3 37.397	3 47.227	7 0.019
8	2 38.584	2 48.413	2 58.243	3 8.072	3 17.902	3 27.731	3 37.561	3 47.390	8 0.022
9	2 38.747	2 48.577	2 58.406	3 8.236	3 18.066	3 27.895	3 37.725	3 47.554	9 0.025
10	2 38.911	2 48.741	2 58.570	3 8.400	3 18.229	3 28.059	3 37.889	3 47.718	10 0.027
11	2 39.075	2 48.905	2 58.734	3 8.564	3 18.393	3 28.223	3 38.052	3 47.882	11 0.030
12	2 39.239	2 49.068	2 58.898	3 8.728	3 18.557	3 28.387	3 38.216	3 48.046	12 0.033
13	2 39.403	2 49.232	2 59.062	3 8.891	3 18.721	3 28.550	3 38.380	3 48.210	13 0.035
14	2 39.566	2 49.396	2 59.226	3 9.055	3 18.885	3 28.714	3 38.544	3 48.373	14 0.038
15	2 39.730	2 49.560	2 59.389	3 9.219	3 19.049	3 28.878	3 38.708	3 48.537	15 0.041
16	2 39.894	2 49.724	2 59.553	3 9.383	3 19.212	3 29.042	3 38.871	3 48.701	16 0.044
17	2 40.058	2 49.888	2 59.717	3 9.547	3 19.376	3 29.206	3 39.035	3 48.865	17 0.046
18	2 40.222	2 50.051	2 59.881	3 9.710	3 19.540	3 29.370	3 39.199	3 49.029	18 0.049
19	2 40.386	2 50.215	3 0.045	3 9.874	3 19.704	3 29.533	3 39.363	3 49.193	19 0.052
20	2 40.549	2 50.379	3 0.209	3 10.038	3 19.868	3 29.697	3 39.527	3 49.356	20 0.055
21	2 40.713	2 50.543	3 0.372	3 10.202	3 20.032	3 29.861	3 39.691	3 49.520	21 0.057
22	2 40.877	2 50.707	3 0.536	3 10.366	3 20.195	3 30.025	3 39.854	3 49.684	22 0.060
23	2 41.041	2 50.870	3 0.700	3 10.530	3 20.359	3 30.189	3 40.018	3 49.848	23 0.063
24	2 41.205	2 51.034	3 0.864	3 10.693	3 20.523	3 30.353	3 40.182	3 50.012	24 0.066
25	2 41.369	2 51.198	3 1.028	3 10.857	3 20.687	3 30.516	3 40.346	3 50.175	25 0.068
26	2 41.532	2 51.362	3 1.192	3 11.021	3 20.851	3 30.680	3 40.510	3 50.339	26 0.071
27	2 41.696	2 51.526	3 1.355	3 11.185	3 21.014	3 30.844	3 40.674	3 50.503	27 0.074
28	2 41.860	2 51.690	3 1.519	3 11.349	3 21.178	3 31.008	3 40.837	3 50.667	28 0.076
29	2 42.024	2 51.853	3 1.683	3 11.513	3 21.342	3 31.172	3 41.001	3 50.831	29 0.079
30	2 42.188	2 52.017	3 1.847	3 11.676	3 21.506	3 31.336	3 41.165	3 50.995	30 0.082
31	2 42.352	2 52.181	3 2.011	3 11.840	3 21.670	3 31.499	3 41.329	3 51.158	31 0.085
32	2 42.515	2 52.345	3 2.174	3 12.004	3 21.834	3 31.663	3 41.493	3 51.322	32 0.087
33	2 42.679	2 52.509	3 2.338	3 12.168	3 21.997	3 31.827	3 41.657	3 51.486	33 0.090
34	2 42.843	2 52.673	3 2.502	3 12.332	3 22.161	3 31.991	3 41.820	3 51.650	34 0.093
35	2 43.007	2 52.836	3 2.666	3 12.496	3 22.325	3 32.155	3 41.984	3 51.814	35 0.096
36	2 43.171	2 53.000	3 2.830	3 12.659	3 22.489	3 32.318	3 42.148	3 51.978	36 0.098
37	2 43.334	2 53.164	3 2.994	3 12.823	3 22.653	3 32.482	3 42.312	3 52.141	37 0.101
38	2 43.498	2 53.328	3 3.157	3 12.987	3 22.817	3 32.646	3 42.476	3 52.305	38 0.104
39	2 43.662	2 53.492	3 3.321	3 13.151	3 22.980	3 32.810	3 42.639	3 52.469	39 0.106
40	2 43.826	2 53.656	3 3.485	3 13.315	3 23.144	3 32.974	3 42.803	3 52.633	40 0.109
41	2 43.990	2 53.819	3 3.649	3 13.478	3 23.308	3 33.138	3 42.967	3 52.797	41 0.112
42	2 44.154	2 53.983	3 3.813	3 13.642	3 23.472	3 33.301	3 43.131	3 52.961	42 0.115
43	2 44.317	2 54.147	3 3.977	3 13.806	3 23.636	3 33.465	3 43.295	3 53.124	43 0.117
44	2 44.481	2 54.311	3 4.140	3 13.970	3 23.800	3 33.629	3 43.459	3 53.288	44 0.120
45	2 44.645	2 54.475	3 4.304	3 14.134	3 23.963	3 33.793	3 43.622	3 53.452	45 0.123
46	2 44.809	2 54.638	3 4.468	3 14.298	3 24.127	3 33.957	3 43.786	3 53.616	46 0.126
47	2 44.973	2 54.802	3 4.632	3 14.461	3 24.291	3 34.121	3 43.950	3 53.780	47 0.128
48	2 45.137	2 54.966	3 4.796	3 14.625	3 24.455	3 34.284	3 44.114	3 53.943	48 0.131
49	2 45.300	2 55.130	3 4.960	3 14.789	3 24.619	3 34.448	3 44.278	3 54.107	49 0.134
50	2 45.464	2 55.294	3 5.123	3 14.953	3 24.782	3 34.612	3 44.442	3 54.271	50 0.137
51	2 45.628	2 55.458	3 5.287	3 15.117	3 24.946	3 34.776	3 44.605	3 54.435	51 0.139
52	2 45.792	2 55.622	3 5.451	3 15.281	3 25.110	3 34.940	3 44.769	3 54.599	52 0.142
53	2 45.956	2 55.785	3 5.615	3 15.444	3 25.274	3 35.104	3 44.933	3 54.763	53 0.145
54	2 46.120	2 55.949	3 5.779	3 15.608	3 25.438	3 35.267	3 45.097	3 54.926	54 0.147
55	2 46.283	2 56.113	3 5.942	3 15.772	3 25.602	3 35.431	3 45.261	3 55.090	55 0.150
56	2 46.447	2 56.277	3 6.106	3 15.936	3 25.765	3 35.595	3 45.425	3 55.254	56 0.153
57	2 46.611	2 56.441	3 6.270	3 16.100	3 25.929	3 35.759	3 45.588	3 55.418	57 0.156
58	2 46.775	2 56.604	3 6.434	3 16.264	3 26.093	3 35.923	3 45.752	3 55.582	58 0.158
59	2 46.939	2 56.768	3 6.598	3 16.427	3 26.257	3 36.086	3 45.916	3 55.746	59 0.161



## MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	0 <sup>h</sup>	1 <sup>h</sup>	2 <sup>h</sup>	3 <sup>h</sup>	4 <sup>h</sup>	5 <sup>h</sup>	6 <sup>h</sup>	7 <sup>h</sup>	For Seconds.
m	m s	m s	m s	m s	m s	m s	m s	m s	s s
0	0 0.000	0 9.856	0 19.713	0 29.569	0 39.426	0 49.282	0 59.139	1 8.995	0 0.000
1	0 0.164	0 10.021	0 19.877	0 29.734	0 39.590	0 49.447	0 59.303	1 9.160	1 0.003
2	0 0.329	0 10.185	0 20.041	0 29.898	0 39.754	0 49.611	0 59.467	1 9.324	2 0.005
3	0 0.493	0 10.349	0 20.206	0 30.062	0 39.919	0 49.775	0 59.632	1 9.488	3 0.008
4	0 0.657	0 10.514	0 20.370	0 30.227	0 40.083	0 49.939	0 59.796	1 9.652	4 0.011
5	0 0.821	0 10.678	0 20.534	0 30.391	0 40.247	0 50.104	0 59.960	1 9.817	5 0.014
6	0 0.986	0 10.842	0 20.699	0 30.555	0 40.412	0 50.268	1 0.124	1 9.981	6 0.016
7	0 1.150	0 11.006	0 20.863	0 30.719	0 40.576	0 50.432	1 0.289	1 10.145	7 0.019
8	0 1.314	0 11.171	0 21.027	0 30.884	0 40.740	0 50.597	1 0.453	1 10.310	8 0.022
9	0 1.478	0 11.335	0 21.191	0 31.048	0 40.904	0 50.761	1 0.617	1 10.474	9 0.025
10	0 1.643	0 11.499	0 21.356	0 31.212	0 41.069	0 50.925	1 0.782	1 10.638	10 0.027
11	0 1.807	0 11.663	0 21.520	0 31.376	0 41.233	0 51.089	1 0.946	1 10.802	11 0.030
12	0 1.971	0 11.828	0 21.684	0 31.541	0 41.397	0 51.254	1 1.110	1 10.967	12 0.033
13	0 2.136	0 11.992	0 21.849	0 31.705	0 41.561	0 51.418	1 1.274	1 11.131	13 0.036
14	0 2.300	0 12.156	0 22.013	0 31.869	0 41.726	0 51.582	1 1.439	1 11.295	14 0.038
15	0 2.464	0 12.321	0 22.177	0 32.034	0 41.890	0 51.746	1 1.603	1 11.459	15 0.041
16	0 2.628	0 12.485	0 22.341	0 32.198	0 42.054	0 51.911	1 1.767	1 11.624	16 0.044
17	0 2.793	0 12.649	0 22.506	0 32.362	0 42.219	0 52.075	1 1.932	1 11.788	17 0.047
18	0 2.957	0 12.813	0 22.670	0 32.526	0 42.383	0 52.239	1 2.096	1 11.952	18 0.049
19	0 3.121	0 12.978	0 22.834	0 32.691	0 42.547	0 52.404	1 2.260	1 12.117	19 0.052
20	0 3.285	0 13.142	0 22.998	0 32.855	0 42.711	0 52.568	1 2.424	1 12.281	20 0.055
21	0 3.450	0 13.306	0 23.163	0 33.019	0 42.876	0 52.732	1 2.589	1 12.445	21 0.057
22	0 3.614	0 13.471	0 23.327	0 33.183	0 43.040	0 52.896	1 2.753	1 12.609	22 0.060
23	0 3.778	0 13.635	0 23.491	0 33.348	0 43.204	0 53.061	1 2.917	1 12.774	23 0.063
24	0 3.943	0 13.799	0 23.656	0 33.512	0 43.368	0 53.225	1 3.081	1 12.938	24 0.066
25	0 4.107	0 13.963	0 23.820	0 33.676	0 43.533	0 53.389	1 3.246	1 13.102	25 0.068
26	0 4.271	0 14.128	0 23.984	0 33.841	0 43.697	0 53.554	1 3.410	1 13.266	26 0.071
27	0 4.435	0 14.292	0 24.148	0 34.005	0 43.861	0 53.718	1 3.574	1 13.431	27 0.074
28	0 4.600	0 14.456	0 24.313	0 34.169	0 44.026	0 53.882	1 3.739	1 13.595	28 0.077
29	0 4.764	0 14.620	0 24.477	0 34.333	0 44.190	0 54.046	1 3.903	1 13.759	29 0.079
30	0 4.928	0 14.785	0 24.641	0 34.498	0 44.354	0 54.211	1 4.067	1 13.924	30 0.082
31	0 5.093	0 14.949	0 24.805	0 34.662	0 44.518	0 54.375	1 4.231	1 14.088	31 0.085
32	0 5.257	0 15.113	0 24.970	0 34.826	0 44.683	0 54.539	1 4.396	1 14.252	32 0.088
33	0 5.421	0 15.278	0 25.134	0 34.990	0 44.847	0 54.703	1 4.560	1 14.416	33 0.090
34	0 5.585	0 15.442	0 25.298	0 35.155	0 45.011	0 54.868	1 4.724	1 14.581	34 0.093
35	0 5.750	0 15.606	0 25.463	0 35.319	0 45.176	0 55.032	1 4.888	1 14.745	35 0.096
36	0 5.914	0 15.770	0 25.627	0 35.483	0 45.340	0 55.196	1 5.053	1 14.909	36 0.099
37	0 6.078	0 15.935	0 25.791	0 35.648	0 45.504	0 55.361	1 5.217	1 15.073	37 0.101
38	0 6.242	0 16.099	0 25.955	0 35.812	0 45.668	0 55.525	1 5.381	1 15.238	38 0.104
39	0 6.407	0 16.263	0 26.120	0 35.976	0 45.833	0 55.689	1 5.546	1 15.402	39 0.107
40	0 6.571	0 16.427	0 26.284	0 36.140	0 45.997	0 55.853	1 5.710	1 15.566	40 0.110
41	0 6.735	0 16.592	0 26.448	0 36.305	0 46.161	0 56.018	1 5.874	1 15.731	41 0.112
42	0 6.900	0 16.756	0 26.612	0 36.469	0 46.325	0 56.182	1 6.038	1 15.895	42 0.115
43	0 7.064	0 16.920	0 26.777	0 36.633	0 46.490	0 56.346	1 6.203	1 16.059	43 0.118
44	0 7.228	0 17.085	0 26.941	0 36.798	0 46.654	0 56.510	1 6.367	1 16.223	44 0.120
45	0 7.392	0 17.249	0 27.105	0 36.962	0 46.818	0 56.675	1 6.531	1 16.388	45 0.123
46	0 7.557	0 17.413	0 27.270	0 37.126	0 46.983	0 56.839	1 6.695	1 16.552	46 0.126
47	0 7.721	0 17.577	0 27.434	0 37.290	0 47.147	0 57.003	1 6.860	1 16.716	47 0.129
48	0 7.885	0 17.742	0 27.598	0 37.455	0 47.311	0 57.168	1 7.024	1 16.881	48 0.131
49	0 8.049	0 17.906	0 27.762	0 37.619	0 47.475	0 57.332	1 7.188	1 17.045	49 0.134
50	0 8.214	0 18.070	0 27.927	0 37.783	0 47.640	0 57.496	1 7.353	1 17.209	50 0.137
51	0 8.378	0 18.234	0 28.091	0 37.947	0 47.804	0 57.660	1 7.517	1 17.373	51 0.140
52	0 8.542	0 18.399	0 28.255	0 38.112	0 47.968	0 57.825	1 7.681	1 17.538	52 0.142
53	0 8.707	0 18.563	0 28.420	0 38.276	0 48.132	0 57.989	1 7.845	1 17.702	53 0.145
54	0 8.871	0 18.727	0 28.584	0 38.440	0 48.297	0 58.153	1 8.010	1 17.866	54 0.148
55	0 9.035	0 18.892	0 28.748	0 38.605	0 48.461	0 58.317	1 8.174	1 18.030	55 0.151
56	0 9.199	0 19.056	0 28.912	0 38.769	0 48.625	0 58.482	1 8.338	1 18.195	56 0.153
57	0 9.364	0 19.220	0 29.077	0 38.933	0 48.790	0 58.646	1 8.502	1 18.359	57 0.156
58	0 9.528	0 19.384	0 29.241	0 39.097	0 48.954	0 58.810	1 8.667	1 18.523	58 0.159
59	0 9.692	0 19.549	0 29.405	0 39.262	0 49.118	0 58.975	1 8.831	1 18.688	59 0.162



## MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	8 <sup>h</sup>	9 <sup>h</sup>	10 <sup>h</sup>	11 <sup>h</sup>	12 <sup>h</sup>	13 <sup>h</sup>	14 <sup>h</sup>	15 <sup>h</sup>	For Seconds.
m	m s	m s	m s	m s	m s	m s	m s	m s	s s
0	1 18.852	1 28.708	1 38.565	1 48.421	1 58.278	2 8.134	2 17.991	2 27.847	0 0.000
1	1 19.016	1 28.873	1 38.729	1 48.585	1 58.442	2 8.298	2 18.155	2 28.011	1 0.003
2	1 19.180	1 29.037	1 38.893	1 48.750	1 58.606	2 8.463	2 18.319	2 28.176	2 0.005
3	1 19.345	1 29.201	1 39.058	1 48.914	1 58.771	2 8.627	2 18.483	2 28.340	3 0.008
4	1 19.509	1 29.365	1 39.222	1 49.078	1 58.935	2 8.791	2 18.648	2 28.504	4 0.011
5	1 19.673	1 29.530	1 39.386	1 49.243	1 59.099	2 8.956	2 18.812	2 28.668	5 0.014
6	1 19.837	1 29.694	1 39.550	1 49.407	1 59.263	2 9.120	2 18.976	2 28.833	6 0.016
7	1 20.002	1 29.858	1 39.715	1 49.571	1 59.428	2 9.284	2 19.141	2 28.997	7 0.019
8	1 20.166	1 30.022	1 39.879	1 49.735	1 59.592	2 9.448	2 19.305	2 29.161	8 0.022
9	1 20.330	1 30.187	1 40.043	1 49.900	1 59.756	2 9.613	2 19.469	2 29.326	9 0.025
10	1 20.495	1 30.351	1 40.207	1 50.064	1 59.920	2 9.777	2 19.633	2 29.490	10 0.027
11	1 20.659	1 30.515	1 40.372	1 50.228	2 0.085	2 9.941	2 19.798	2 29.654	11 0.030
12	1 20.823	1 30.680	1 40.536	1 50.393	2 0.249	2 10.105	2 19.962	2 29.818	12 0.033
13	1 20.987	1 30.844	1 40.700	1 50.557	2 0.413	2 10.270	2 20.126	2 29.983	13 0.036
14	1 21.152	1 31.008	1 40.865	1 50.721	2 0.578	2 10.434	2 20.290	2 30.147	14 0.038
15	1 21.316	1 31.172	1 41.029	1 50.885	2 0.742	2 10.598	2 20.455	2 30.311	15 0.041
16	1 21.480	1 31.337	1 41.193	1 51.050	2 0.906	2 10.763	2 20.619	2 30.476	16 0.044
17	1 21.644	1 31.501	1 41.357	1 51.214	2 1.070	2 10.927	2 20.783	2 30.640	17 0.047
18	1 21.809	1 31.665	1 41.522	1 51.378	2 1.235	2 11.091	2 20.948	2 30.804	18 0.049
19	1 21.973	1 31.829	1 41.686	1 51.542	2 1.399	2 11.255	2 21.112	2 30.968	19 0.052
20	1 22.137	1 31.994	1 41.850	1 51.707	2 1.563	2 11.420	2 21.276	2 31.133	20 0.055
21	1 22.302	1 32.158	1 42.015	1 51.871	2 1.727	2 11.584	2 21.440	2 31.297	21 0.057
22	1 22.466	1 32.322	1 42.179	1 52.035	2 1.892	2 11.748	2 21.605	2 31.461	22 0.060
23	1 22.630	1 32.487	1 42.343	1 52.200	2 2.056	2 11.912	2 21.769	2 31.625	23 0.063
24	1 22.794	1 32.651	1 42.507	1 52.364	2 2.220	2 12.077	2 21.933	2 31.790	24 0.066
25	1 22.959	1 32.815	1 42.672	1 52.528	2 2.385	2 12.241	2 22.098	2 31.954	25 0.068
26	1 23.123	1 32.979	1 42.836	1 52.692	2 2.549	2 12.405	2 22.262	2 32.118	26 0.071
27	1 23.287	1 33.144	1 43.000	1 52.857	2 2.713	2 12.570	2 22.426	2 32.283	27 0.074
28	1 23.451	1 33.308	1 43.164	1 53.021	2 2.877	2 12.734	2 22.590	2 32.447	28 0.077
29	1 23.616	1 33.472	1 43.329	1 53.185	2 3.042	2 12.898	2 22.755	2 32.611	29 0.079
30	1 23.780	1 33.637	1 43.493	1 53.349	2 3.206	2 13.062	2 22.919	2 32.775	30 0.082
31	1 23.944	1 33.801	1 43.657	1 53.514	2 3.370	2 13.227	2 23.083	2 32.940	31 0.085
32	1 24.109	1 33.965	1 43.822	1 53.678	2 3.534	2 13.391	2 23.247	2 33.104	32 0.088
33	1 24.273	1 34.129	1 43.986	1 53.842	2 3.699	2 13.555	2 23.412	2 33.268	33 0.090
34	1 24.437	1 34.294	1 44.150	1 54.007	2 3.863	2 13.720	2 23.576	2 33.432	34 0.093
35	1 24.601	1 34.458	1 44.314	1 54.171	2 4.027	2 13.884	2 23.740	2 33.597	35 0.096
36	1 24.766	1 34.622	1 44.479	1 54.335	2 4.192	2 14.048	2 23.905	2 33.761	36 0.099
37	1 24.930	1 34.786	1 44.643	1 54.499	2 4.356	2 14.212	2 24.069	2 33.925	37 0.101
38	1 25.094	1 34.951	1 44.807	1 54.664	2 4.520	2 14.377	2 24.233	2 34.090	38 0.104
39	1 25.259	1 35.115	1 44.971	1 54.828	2 4.684	2 14.541	2 24.397	2 34.254	39 0.107
40	1 25.423	1 35.279	1 45.136	1 54.992	2 4.849	2 14.705	2 24.562	2 34.418	40 0.110
41	1 25.587	1 35.444	1 45.300	1 55.156	2 5.013	2 14.869	2 24.726	2 34.582	41 0.112
42	1 25.751	1 35.608	1 45.464	1 55.321	2 5.177	2 15.034	2 24.890	2 34.747	42 0.115
43	1 25.916	1 35.772	1 45.629	1 55.485	2 5.342	2 15.198	2 25.054	2 34.911	43 0.118
44	1 26.080	1 35.936	1 45.793	1 55.649	2 5.506	2 15.362	2 25.219	2 35.075	44 0.120
45	1 26.244	1 36.101	1 45.957	1 55.814	2 5.670	2 15.527	2 25.383	2 35.239	45 0.123
46	1 26.408	1 36.265	1 46.121	1 55.978	2 5.834	2 15.691	2 25.547	2 35.404	46 0.126
47	1 26.573	1 36.429	1 46.286	1 56.142	2 5.999	2 15.855	2 25.712	2 35.568	47 0.129
48	1 26.737	1 36.593	1 46.450	1 56.306	2 6.163	2 16.019	2 25.876	2 35.732	48 0.131
49	1 26.901	1 36.758	1 46.614	1 56.471	2 6.327	2 16.184	2 26.040	2 35.897	49 0.134
50	1 27.066	1 36.922	1 46.778	1 56.635	2 6.491	2 16.348	2 26.204	2 36.061	50 0.137
51	1 27.230	1 37.086	1 46.943	1 56.799	2 6.656	2 16.512	2 26.369	2 36.225	51 0.140
52	1 27.394	1 37.251	1 47.107	1 56.964	2 6.820	2 16.676	2 26.533	2 36.389	52 0.142
53	1 27.558	1 37.415	1 47.271	1 57.128	2 6.984	2 16.841	2 26.697	2 36.554	53 0.145
54	1 27.723	1 37.579	1 47.436	1 57.292	2 7.149	2 17.005	2 26.861	2 36.718	54 0.148
55	1 27.887	1 37.743	1 47.600	1 57.456	2 7.313	2 17.169	2 27.026	2 36.882	55 0.151
56	1 28.051	1 37.908	1 47.764	1 57.621	2 7.477	2 17.334	2 27.190	2 37.047	56 0.153
57	1 28.215	1 38.072	1 47.928	1 57.785	2 7.641	2 17.498	2 27.354	2 37.211	57 0.156
58	1 28.380	1 38.236	1 48.093	1 57.949	2 7.806	2 17.662	2 27.519	2 37.375	58 0.159
59	1 28.544	1 38.400	1 48.257	1 58.113	2 7.970	2 17.826	2 27.683	2 37.539	59 0.162

## MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	16 <sup>h</sup>	17 <sup>h</sup>	18 <sup>h</sup>	19 <sup>h</sup>	20 <sup>h</sup>	21 <sup>h</sup>	22 <sup>h</sup>	23 <sup>h</sup>	For Seconds.
m	m s	m s	m s	m s	m s	m s	m s	m s	s s
0	2 37.704	2 47.560	2 57.417	3 7.273	3 17.129	3 26.986	3 36.842	3 46.699	0 0.000
1	2 37.868	2 47.724	2 57.581	3 7.437	3 17.294	3 27.150	3 37.007	3 46.863	1 0.003
2	2 38.032	2 47.889	2 57.745	3 7.602	3 17.458	3 27.315	3 37.171	3 47.027	2 0.005
3	2 38.196	2 48.053	2 57.909	3 7.766	3 17.622	3 27.479	3 37.335	3 47.192	3 0.008
4	2 38.361	2 48.217	2 58.074	3 7.930	3 17.787	3 27.643	3 37.500	3 47.356	4 0.011
5	2 38.525	2 48.381	2 58.238	3 8.094	3 17.951	3 27.807	3 37.664	3 47.520	5 0.014
6	2 38.689	2 48.546	2 58.402	3 8.259	3 18.115	3 27.972	3 37.828	3 47.685	6 0.016
7	2 38.854	2 48.710	2 58.566	3 8.423	3 18.279	3 28.136	3 37.992	3 47.849	7 0.019
8	2 39.018	2 48.874	2 58.731	3 8.587	3 18.444	3 28.300	3 38.157	3 48.013	8 0.022
9	2 39.182	2 49.039	2 58.895	3 8.751	3 18.608	3 28.464	3 38.321	3 48.177	9 0.025
10	2 39.346	2 49.203	2 59.059	3 8.916	3 18.772	3 28.629	3 38.485	3 48.342	10 0.027
11	2 39.511	2 49.367	2 59.224	3 9.080	3 18.937	3 28.793	3 38.649	3 48.506	11 0.030
12	2 39.675	2 49.531	2 59.388	3 9.244	3 19.101	3 28.957	3 38.814	3 48.670	12 0.033
13	2 39.839	2 49.696	2 59.552	3 9.409	3 19.265	3 29.122	3 38.978	3 48.834	13 0.036
14	2 40.003	2 49.860	2 59.716	3 9.573	3 19.429	3 29.286	3 39.142	3 48.999	14 0.038
15	2 40.168	2 50.024	2 59.881	3 9.737	3 19.594	3 29.450	3 39.307	3 49.163	15 0.041
16	2 40.332	2 50.188	3 0.045	3 9.901	3 19.758	3 29.614	3 39.471	3 49.327	16 0.044
17	2 40.496	2 50.353	3 0.209	3 10.066	3 19.922	3 29.779	3 39.635	3 49.492	17 0.047
18	2 40.661	2 50.517	3 0.373	3 10.230	3 20.086	3 29.943	3 39.799	3 49.656	18 0.049
19	2 40.825	2 50.681	3 0.538	3 10.394	3 20.251	3 30.107	3 39.964	3 49.820	19 0.052
20	2 40.989	2 50.846	3 0.702	3 10.559	3 20.415	3 30.271	3 40.128	3 49.984	20 0.055
21	2 41.153	2 51.010	3 0.866	3 10.723	3 20.579	3 30.436	3 40.292	3 50.149	21 0.057
22	2 41.318	2 51.174	3 1.031	3 10.887	3 20.744	3 30.600	3 40.456	3 50.313	22 0.060
23	2 41.482	2 51.338	3 1.195	3 11.051	3 20.908	3 30.764	3 40.621	3 50.477	23 0.063
24	2 41.646	2 51.503	3 1.359	3 11.216	3 21.072	3 30.929	3 40.785	3 50.642	24 0.066
25	2 41.810	2 51.667	3 1.523	3 11.380	3 21.236	3 31.093	3 40.949	3 50.806	25 0.068
26	2 41.975	2 51.831	3 1.688	3 11.544	3 21.401	3 31.257	3 41.114	3 50.970	26 0.071
27	2 42.139	2 51.995	3 1.852	3 11.708	3 21.565	3 31.421	3 41.278	3 51.134	27 0.074
28	2 42.303	2 52.160	3 2.016	3 11.873	3 21.729	3 31.586	3 41.442	3 51.299	28 0.077
29	2 42.468	2 52.324	3 2.181	3 12.037	3 21.893	3 31.750	3 41.606	3 51.463	29 0.079
30	2 42.632	2 52.488	3 2.345	3 12.201	3 22.058	3 31.914	3 41.771	3 51.627	30 0.082
31	2 42.796	2 52.653	3 2.509	3 12.366	3 22.222	3 32.078	3 41.935	3 51.791	31 0.085
32	2 42.960	2 52.817	3 2.673	3 12.530	3 22.386	3 32.243	3 42.099	3 51.956	32 0.088
33	2 43.125	2 52.981	3 2.838	3 12.694	3 22.551	3 32.407	3 42.264	3 52.120	33 0.090
34	2 43.289	2 53.145	3 3.002	3 12.858	3 22.715	3 32.571	3 42.428	3 52.284	34 0.093
35	2 43.453	2 53.310	3 3.166	3 13.023	3 22.879	3 32.736	3 42.592	3 52.449	35 0.096
36	2 43.617	2 53.474	3 3.330	3 13.187	3 23.043	3 32.900	3 42.756	3 52.613	36 0.099
37	2 43.782	2 53.638	3 3.495	3 13.351	3 23.208	3 33.064	3 42.921	3 52.777	37 0.101
38	2 43.946	2 53.803	3 3.659	3 13.515	3 23.372	3 33.228	3 43.085	3 52.941	38 0.104
39	2 44.110	2 53.967	3 3.823	3 13.680	3 23.536	3 33.393	3 43.249	3 53.106	39 0.107
40	2 44.275	2 54.131	3 3.988	3 13.844	3 23.700	3 33.557	3 43.413	3 53.270	40 0.110
41	2 44.439	2 54.295	3 4.152	3 14.008	3 23.865	3 33.721	3 43.578	3 53.434	41 0.112
42	2 44.603	2 54.460	3 4.316	3 14.173	3 24.029	3 33.886	3 43.742	3 53.598	42 0.115
43	2 44.767	2 54.624	3 4.480	3 14.337	3 24.193	3 34.050	3 43.906	3 53.763	43 0.118
44	2 44.932	2 54.788	3 4.645	3 14.501	3 24.358	3 34.214	3 44.071	3 53.927	44 0.120
45	2 45.096	2 54.952	3 4.809	3 14.665	3 24.522	3 34.378	3 44.235	3 54.091	45 0.123
46	2 45.260	2 55.117	3 4.973	3 14.830	3 24.686	3 34.543	3 44.399	3 54.256	46 0.126
47	2 45.425	2 55.281	3 5.137	3 14.994	3 24.850	3 34.707	3 44.563	3 54.420	47 0.129
48	2 45.589	2 55.445	3 5.302	3 15.158	3 25.015	3 34.871	3 44.728	3 54.584	48 0.131
49	2 45.753	2 55.610	3 5.466	3 15.322	3 25.179	3 35.035	3 44.892	3 54.748	49 0.134
50	2 45.917	2 55.774	3 5.630	3 15.487	3 25.343	3 35.200	3 45.056	3 54.913	50 0.137
51	2 46.082	2 55.938	3 5.795	3 15.651	3 25.508	3 35.364	3 45.220	3 55.077	51 0.140
52	2 46.246	2 56.102	3 5.959	3 15.815	3 25.672	3 35.528	3 45.385	3 55.241	52 0.142
53	2 46.410	2 56.267	3 6.123	3 15.980	3 25.836	3 35.693	3 45.549	3 55.405	53 0.145
54	2 46.574	2 56.431	3 6.287	3 16.144	3 26.000	3 35.857	3 45.713	3 55.570	54 0.148
55	2 46.739	2 56.595	3 6.452	3 16.308	3 26.165	3 36.021	3 45.878	3 55.734	55 0.151
56	2 46.903	2 56.759	3 6.616	3 16.472	3 26.329	3 36.185	3 46.042	3 55.898	56 0.153
57	2 47.067	2 56.924	3 6.780	3 16.637	3 26.493	3 36.350	3 46.206	3 56.063	57 0.156
58	2 47.232	2 57.088	3 6.944	3 16.801	3 26.657	3 36.514	3 46.370	3 56.227	58 0.159
59	2 47.396	2 57.252	3 7.109	3 16.965	3 26.822	3 36.678	3 46.535	3 56.391	59 0.162

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

H. A.	Lat.		10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat.		H. A.
	h	m	°	'	°	'	°	'	°	'	°	'	h	
0	0	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24	0
	10		0 3.0	0 3.1	0 3.2	0 3.2	0 3.3	0 3.3	0 3.4	0 3.5	0 3.5		23	50
	20		0 6.0	0 6.2	0 6.3	0 6.4	0 6.5	0 6.6	0 6.8	0 6.9	0 7.1			40
0	30		0 9.0	0 9.2	0 9.5	0 9.6	0 9.8	0 10.0	0 10.1	0 10.3	0 10.6		23	30
	40		0 12.0	0 12.3	0 12.6	0 12.8	0 13.0	0 13.2	0 13.5	0 13.8	0 14.1			20
	50		0 15.0	0 15.3	0 15.7	0 16.0	0 16.2	0 16.5	0 16.8	0 17.2	0 17.5			10
1	0		0 17.9	0 18.3	0 18.8	0 19.1	0 19.4	0 19.7	0 20.1	0 20.5	0 21.0		23	0
	10		0 20.8	0 21.3	0 21.9	0 22.2	0 22.5	0 22.9	0 23.4	0 23.8	0 24.4		22	50
	20		0 23.7	0 24.2	0 24.9	0 25.2	0 25.6	0 26.1	0 26.6	0 27.1	0 27.7			40
1	30		0 26.5	0 27.0	0 27.8	0 28.2	0 28.7	0 29.2	0 29.7	0 30.3	0 31.0		22	30
	40		0 29.2	0 29.9	0 30.7	0 31.2	0 31.7	0 32.2	0 32.8	0 33.5	0 34.2			20
	50		0 31.9	0 32.6	0 33.6	0 34.1	0 34.6	0 35.2	0 35.8	0 36.6	0 37.4			10
2	0		0 34.6	0 35.3	0 36.4	0 36.9	0 37.5	0 38.1	0 38.8	0 39.6	0 40.5		22	0
	10		0 37.2	0 37.9	0 39.1	0 39.6	0 40.2	0 40.9	0 41.7	0 42.5	0 43.5		21	50
	20		0 39.7	0 40.5	0 41.7	0 42.3	0 42.9	0 43.7	0 44.5	0 45.4	0 46.4			40
2	30		0 42.1	0 43.0	0 44.2	0 44.9	0 45.6	0 46.4	0 47.2	0 48.2	0 49.2		21	30
	40		0 44.5	0 45.4	0 46.7	0 47.4	0 48.1	0 48.9	0 49.8	0 50.8	0 52.0			20
	50		0 46.7	0 47.7	0 49.1	0 49.8	0 50.6	0 51.4	0 52.4	0 53.4	0 54.6			10
3	0		0 48.9	0 49.9	0 51.4	0 52.1	0 52.9	0 53.8	0 54.8	0 55.9	0 57.1		21	0
	10		0 51.0	0 52.0	0 53.6	0 54.3	0 55.2	0 56.1	0 57.1	0 58.3	0 59.5		20	50
	20		0 52.9	0 54.0	0 55.6	0 56.4	0 57.3	0 58.2	0 59.3	1 0.5	1 1.8			40
3	30		0 54.8	0 56.0	0 57.6	0 58.4	0 59.3	1 0.3	1 1.4	1 2.7	1 4.0		20	30
	40		0 56.6	0 57.8	0 59.5	1 0.3	1 1.2	1 2.2	1 3.4	1 4.7	1 6.1			20
	50		0 58.3	0 59.5	1 1.2	1 2.1	1 3.0	1 4.1	1 5.2	1 6.6	1 8.0			10
4	0		0 59.8	1 1.1	1 2.8	1 3.7	1 4.7	1 5.8	1 7.0	1 8.3	1 9.8		20	0
	10		1 1.3	1 2.5	1 4.3	1 5.2	1 6.2	1 7.3	1 8.6	1 9.9	1 11.4		19	50
	20		1 2.6	1 3.9	1 5.7	1 6.6	1 7.6	1 8.8	1 10.0	1 11.4	1 13.0			40
4	30		1 3.8	1 5.1	1 7.0	1 7.9	1 8.9	1 10.1	1 11.4	1 12.8	1 14.3		19	30
	40		1 4.9	1 6.2	1 8.1	1 9.0	1 10.1	1 11.2	1 12.5	1 14.0	1 15.6			20
	50		1 5.8	1 7.2	1 9.1	1 10.0	1 11.1	1 12.3	1 13.6	1 15.1	1 16.7			10
5	0		1 6.7	1 8.0	1 9.9	1 10.9	1 12.0	1 13.2	1 14.5	1 16.0	1 17.6		19	0
	10		1 7.4	1 8.7	1 10.7	1 11.6	1 12.7	1 13.9	1 15.3	1 16.8	1 18.4		18	50
	20		1 8.0	1 9.3	1 11.3	1 12.2	1 13.3	1 14.5	1 15.9	1 17.4	1 19.0			40
5	30		1 8.4	1 9.8	1 11.7	1 12.7	1 13.8	1 15.0	1 16.4	1 17.9	1 19.5		18	30
	40		1 8.7	1 10.1	1 12.0	1 13.0	1 14.1	1 15.3	1 16.7	1 18.2	1 19.9			20
	50		1 8.9	1 10.3	1 12.2	1 13.2	1 14.3	1 15.5	1 16.9	1 18.4	1 20.1			10
6	0		1 9.0	1 10.3	1 12.3	1 13.2	1 14.3	1 15.6	1 16.9	1 18.4	1 20.1		18	0
	10		1 8.9	1 10.2	1 12.2	1 13.2	1 14.2	1 15.5	1 16.8	1 18.3	1 20.0		17	50
	20		1 8.7	1 10.0	1 12.0	1 12.9	1 14.0	1 15.2	1 16.6	1 18.0	1 19.7			40
6	30		1 8.3	1 9.7	1 11.6	1 12.5	1 13.6	1 14.8	1 16.2	1 17.6	1 19.3		17	30
	40		1 7.9	1 9.2	1 11.1	1 12.0	1 13.1	1 14.3	1 15.6	1 17.1	1 18.7			20
	50		1 7.3	1 8.6	1 10.5	1 11.4	1 12.4	1 13.6	1 14.9	1 16.4	1 18.0			10
7	0		1 6.6	1 7.8	1 9.7	1 10.6	1 11.6	1 12.8	1 14.1	1 15.5	1 17.1		17	0
	10		1 5.7	1 6.9	1 8.8	1 9.7	1 10.7	1 11.9	1 13.1	1 14.5	1 16.1		16	50
	20		1 4.7	1 5.9	1 7.8	1 8.6	1 9.6	1 10.8	1 12.0	1 13.4	1 14.9			40
7	30		1 3.6	1 4.8	1 6.6	1 7.5	1 8.4	1 9.6	1 10.8	1 12.1	1 13.6		16	30
	40		1 2.4	1 3.6	1 5.3	1 6.2	1 7.1	1 8.2	1 9.4	1 10.7	1 12.2			20
	50		1 1.1	1 2.2	1 3.9	1 4.7	1 5.7	1 6.7	1 7.9	1 9.2	1 10.6			10
8	0		0 59.6	1 0.7	1 2.4	1 3.2	1 4.1	1 5.1	1 6.3	1 7.5	1 8.9		16	0
	10		0 58.1	0 59.1	1 0.7	1 1.5	1 2.4	1 3.4	1 4.5	1 5.7	1 7.1		15	50
	20		0 56.4	0 57.4	0 59.0	0 59.7	1 0.6	1 1.6	1 2.6	1 3.8	1 5.1			40
8	30		0 54.6	0 55.6	0 57.1	0 57.8	0 58.7	0 59.6	1 0.6	1 1.8	1 3.1		15	30
	40		0 52.7	0 53.7	0 55.1	0 55.8	0 56.6	0 57.5	0 58.5	0 59.6	1 0.9			20
	50		0 50.7	0 51.6	0 53.0	0 53.7	0 54.5	0 55.4	0 56.3	0 57.4	0 58.6			10
9	0		0 48.6	0 49.5	0 50.8	0 51.5	0 52.2	0 53.1	0 54.0	0 55.0	0 56.1		15	0

TABLE IV.

## AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H.A.	10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat. H.A.
h m	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m
9 0	0 48.6	0 49.5	0 50.8	0 51.5	0 52.2	0 53.1	0 54.0	0 55.0	0 56.1	15 0
10	0 46.5	0 47.3	0 48.6	0 49.2	0 49.9	0 50.7	0 51.6	0 52.5	0 53.6	14 50
20	0 44.2	0 45.0	0 46.2	0 46.8	0 47.5	0 48.2	0 49.0	0 50.0	0 51.0	40
9 30	0 41.9	0 42.6	0 43.7	0 44.3	0 44.9	0 45.6	0 46.4	0 47.3	0 48.3	14 30
40	0 39.5	0 40.2	0 41.2	0 41.7	0 42.3	0 43.0	0 43.7	0 44.6	0 45.5	20
50	0 37.0	0 37.6	0 38.6	0 39.1	0 39.6	0 40.3	0 41.0	0 41.7	0 42.6	10
10 0	0 34.4	0 35.0	0 35.9	0 36.4	0 36.9	0 37.5	0 38.1	0 38.8	0 39.6	14 0
10	0 31.8	0 32.3	0 33.1	0 33.6	0 34.1	0 34.6	0 35.2	0 35.8	0 36.6	13 50
20	0 29.1	0 29.6	0 30.3	0 30.7	0 31.2	0 31.7	0 32.2	0 32.8	0 33.5	40
10 30	0 26.3	0 26.8	0 27.5	0 27.8	0 28.2	0 28.7	0 29.2	0 29.7	0 30.3	13 30
40	0 23.5	0 23.9	0 24.6	0 24.9	0 25.2	0 25.6	0 26.0	0 26.5	0 27.1	20
50	0 20.7	0 21.0	0 21.6	0 21.9	0 22.2	0 22.5	0 22.9	0 23.3	0 23.8	10
11 0	0 17.8	0 18.1	0 18.6	0 18.8	0 19.1	0 19.4	0 19.7	0 20.1	0 20.5	13 0
10	0 14.9	0 15.1	0 15.5	0 15.7	0 16.0	0 16.2	0 16.5	0 16.8	0 17.1	12 50
20	0 11.9	0 12.1	0 12.5	0 12.6	0 12.8	0 13.0	0 13.2	0 13.5	0 13.7	40
11 30	0 9.0	0 9.1	0 9.4	0 9.5	0 9.6	0 9.8	0 9.9	0 10.1	0 10.3	12 30
40	0 6.0	0 6.1	0 6.2	0 6.3	0 6.4	0 6.5	0 6.6	0 6.8	0 6.9	20
50	0 3.0	0 3.0	0 3.1	0 3.2	0 3.2	0 3.3	0 3.3	0 3.4	0 3.5	10
12 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12 0

Lat. H.A.	32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat. H.A.
h m	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m
0 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24 0
10	0 3.5	0 3.6	0 3.7	0 3.8	0 3.9	0 4.1	0 4.2	0 4.4	0 4.5	23 50
20	0 7.1	0 7.2	0 7.4	0 7.6	0 7.8	0 8.1	0 8.4	0 8.7	0 9.0	40
0 30	0 10.6	0 10.8	0 11.1	0 11.4	0 11.8	0 12.1	0 12.6	0 13.0	0 13.5	23 30
40	0 14.1	0 14.4	0 14.8	0 15.2	0 15.7	0 16.1	0 16.7	0 17.3	0 18.0	20
50	0 17.5	0 18.0	0 18.4	0 18.9	0 19.5	0 20.1	0 20.8	0 21.6	0 22.4	10
1 0	0 21.0	0 21.5	0 22.0	0 22.6	0 23.3	0 24.1	0 24.9	0 25.8	0 26.8	23 0
10	0 24.4	0 24.9	0 25.6	0 26.3	0 27.1	0 28.0	0 28.9	0 30.0	0 31.2	22 50
20	0 27.7	0 28.4	0 29.1	0 29.9	0 30.8	0 31.8	0 32.9	0 34.1	0 35.4	40
1 30	0 31.0	0 31.7	0 32.5	0 33.4	0 34.4	0 35.6	0 36.8	0 38.1	0 39.6	22 30
40	0 34.2	0 35.0	0 35.9	0 36.9	0 38.0	0 39.3	0 40.6	0 42.1	0 43.8	20
50	0 37.4	0 38.3	0 39.3	0 40.3	0 41.5	0 42.9	0 44.3	0 46.0	0 47.8	10
2 0	0 40.5	0 41.4	0 42.5	0 43.7	0 45.0	0 46.4	0 48.0	0 49.8	0 51.7	22 0
10	0 43.5	0 44.5	0 45.6	0 46.9	0 48.3	0 49.8	0 51.5	0 53.4	0 55.5	21 50
20	0 46.4	0 47.5	0 48.7	0 50.1	0 51.6	0 53.2	0 55.0	0 57.0	0 59.3	40
2 30	0 49.2	0 50.4	0 51.7	0 53.1	0 54.7	0 56.4	0 58.3	1 0.5	1 2.9	21 30
40	0 52.0	0 53.2	0 54.6	0 56.0	0 57.7	0 59.6	1 1.6	1 3.8	1 6.3	20
50	0 54.6	0 55.9	0 57.3	0 58.9	1 0.6	1 2.6	1 4.7	1 7.0	1 9.7	10
3 0	0 57.1	0 58.5	1 0.0	1 1.6	1 3.4	1 5.4	1 7.7	1 10.1	1 12.9	21 0
10	0 59.5	1 0.9	1 2.5	1 4.2	1 6.1	1 8.2	1 10.5	1 13.1	1 15.9	20 50
20	1 1.8	1 3.3	1 4.9	1 6.7	1 8.6	1 10.8	1 13.2	1 15.9	1 18.8	40
3 30	1 4.0	1 5.5	1 7.2	1 9.0	1 11.0	1 13.3	1 15.8	1 18.5	1 21.6	20 30
40	1 6.1	1 7.6	1 9.3	1 11.2	1 13.3	1 15.6	1 18.2	1 21.0	1 24.2	20
50	1 8.0	1 9.6	1 11.4	1 13.3	1 15.4	1 17.8	1 20.4	1 23.4	1 26.6	10
4 0	1 9.8	1 11.4	1 13.2	1 15.2	1 17.4	1 19.8	1 22.5	1 25.5	1 28.9	20 0
10	1 11.4	1 13.1	1 15.0	1 17.0	1 19.2	1 21.7	1 24.5	1 27.5	1 31.0	19 50
20	1 13.0	1 14.7	1 16.6	1 18.6	1 20.9	1 23.4	1 26.3	1 29.4	1 32.9	40
4 30	1 14.3	1 16.1	1 18.0	1 20.1	1 22.4	1 25.0	1 27.9	1 31.0	1 34.6	19 30
40	1 15.6	1 17.3	1 19.3	1 21.4	1 23.8	1 26.4	1 29.3	1 32.5	1 36.1	20
50	1 16.7	1 18.4	1 20.4	1 22.6	1 25.0	1 27.6	1 30.6	1 33.8	1 37.4	10
5 0	1 17.6	1 19.4	1 21.4	1 23.6	1 26.0	1 28.7	1 31.7	1 34.9	1 38.6	19 0

## AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H.A.		32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat. H.A.	
h m	5 0	1 17.6	1 19.4	1 21.4	1 23.6	1 26.0	1 28.7	1 31.7	1 34.9	1 38.6	h m	19 0
	10	1 18.4	1 20.2	1 22.2	1 24.4	1 26.9	1 29.6	1 32.6	1 35.9	1 39.6		18 50
	20	1 19.0	1 20.9	1 22.9	1 25.1	1 27.6	1 30.3	1 33.3	1 36.6	1 40.3		40
5 30	5 30	1 19.5	1 21.4	1 23.4	1 25.6	1 28.1	1 30.8	1 33.8	1 37.2	1 40.9	18 30	18 30
	40	1 19.9	1 21.7	1 23.7	1 26.0	1 28.5	1 31.2	1 34.2	1 37.6	1 41.3		20
	50	1 20.1	1 21.9	1 23.9	1 26.2	1 28.6	1 31.4	1 34.4	1 37.8	1 41.5		10
6 0	6 0	1 20.1	1 21.9	1 24.0	1 26.2	1 28.7	1 31.4	1 34.4	1 37.8	1 41.5	18 0	18 0
	10	1 20.0	1 21.8	1 23.8	1 26.0	1 28.5	1 31.2	1 34.2	1 37.6	1 41.3		17 50
	20	1 19.7	1 21.5	1 23.5	1 25.7	1 28.2	1 30.9	1 33.9	1 37.2	1 40.9		40
6 30	6 30	1 19.3	1 21.1	1 23.1	1 25.3	1 27.7	1 30.4	1 33.4	1 36.7	1 40.3	17 30	17 30
	40	1 18.7	1 20.5	1 22.5	1 24.7	1 27.1	1 29.7	1 32.7	1 35.9	1 39.6		20
	50	1 18.0	1 19.8	1 21.7	1 23.9	1 26.2	1 28.9	1 31.8	1 35.0	1 38.6		10
7 0	7 0	1 17.1	1 18.9	1 20.8	1 22.9	1 25.3	1 27.9	1 30.7	1 33.9	1 37.5	17 0	17 0
	10	1 16.1	1 17.8	1 19.7	1 21.8	1 24.1	1 26.7	1 29.5	1 32.7	1 36.2		16 50
	20	1 14.9	1 16.6	1 18.5	1 20.6	1 22.8	1 25.4	1 28.1	1 31.2	1 34.7		40
7 30	7 30	1 13.6	1 15.3	1 17.1	1 19.1	1 21.4	1 23.9	1 26.6	1 29.6	1 33.0	16 30	16 30
	40	1 12.2	1 13.8	1 15.6	1 17.6	1 19.8	1 22.2	1 24.9	1 27.8	1 31.1		20
	50	1 10.6	1 12.2	1 14.0	1 15.9	1 18.0	1 20.4	1 23.0	1 25.9	1 29.1		10
8 0	8 0	1 8.9	1 10.5	1 12.2	1 14.1	1 16.1	1 18.4	1 21.0	1 23.8	1 26.9	16 0	16 0
	10	1 7.1	1 8.6	1 10.3	1 12.1	1 14.1	1 16.3	1 18.8	1 21.6	1 24.6		15 50
	20	1 5.1	1 6.6	1 8.2	1 10.0	1 11.9	1 14.1	1 16.5	1 19.2	1 22.1		40
8 30	8 30	1 3.1	1 4.5	1 6.0	1 7.7	1 9.6	1 11.7	1 14.0	1 16.6	1 19.4	15 30	15 30
	40	1 0.9	1 2.2	1 3.7	1 5.4	1 7.2	1 9.2	1 11.4	1 13.9	1 16.7		20
	50	0 58.6	0 59.9	1 1.3	1 2.9	1 4.6	1 6.6	1 8.7	1 11.1	1 13.7		10
9 0	9 0	0 56.1	0 57.4	0 58.8	1 0.3	1 2.0	1 3.8	1 5.9	1 8.1	1 10.7	15 0	15 0
	10	0 53.6	0 54.8	0 56.1	0 57.6	0 59.2	1 0.9	1 2.9	1 5.1	1 7.5		14 50
	20	0 51.0	0 52.1	0 53.4	0 54.7	0 56.3	0 57.9	0 59.8	1 1.8	1 4.1		40
9 30	9 30	0 48.3	0 49.3	0 50.5	0 51.8	0 53.3	0 54.8	0 56.6	0 58.5	1 0.7	14 30	14 30
	40	0 45.5	0 46.5	0 47.6	0 48.8	0 50.2	0 51.7	0 53.3	0 55.1	0 57.2		20
	50	0 42.6	0 43.5	0 44.6	0 45.7	0 47.0	0 48.4	0 49.9	0 51.6	0 53.5		10
10 0	10 0	0 39.6	0 40.5	0 41.5	0 42.5	0 43.7	0 45.0	0 46.4	0 48.0	0 49.8	14 0	14 0
	10	0 36.6	0 37.4	0 38.3	0 39.2	0 40.3	0 41.5	0 42.9	0 44.3	0 46.0		13 50
	20	0 33.5	0 34.2	0 35.0	0 35.9	0 36.9	0 38.0	0 39.2	0 40.6	0 42.1		40
10 30	10 30	0 30.3	0 31.0	0 31.7	0 32.5	0 33.4	0 34.4	0 35.5	0 36.7	0 38.1	13 30	13 30
	40	0 27.1	0 27.7	0 28.3	0 29.0	0 29.9	0 30.7	0 31.7	0 32.8	0 34.0		20
	50	0 23.8	0 24.3	0 24.9	0 25.5	0 26.3	0 27.0	0 27.9	0 28.8	0 29.9		10
11 0	11 0	0 20.5	0 20.9	0 21.4	0 22.0	0 22.6	0 23.3	0 24.0	0 24.8	0 25.7	13 0	13 0
	10	0 17.1	0 17.5	0 17.9	0 18.4	0 18.9	0 19.4	0 20.1	0 20.7	0 21.5		12 50
	20	0 13.7	0 14.0	0 14.4	0 14.7	0 15.1	0 15.6	0 16.1	0 16.6	0 17.2		40
11 30	11 30	0 10.3	0 10.5	0 10.8	0 11.1	0 11.4	0 11.7	0 12.1	0 12.5	0 13.0	12 30	12 30
	40	0 6.9	0 7.0	0 7.2	0 7.4	0 7.6	0 7.8	0 8.1	0 8.3	0 8.6		20
	50	0 3.5	0 3.5	0 3.6	0 3.7	0 3.8	0 3.9	0 4.0	0 4.2	0 4.3		10
12 0	12 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12 0	12 0

Lat. H.A.		48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H.A.	
h m	0 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	h m	24 0
	10	0 4.5	0 4.7	0 4.9	0 5.2	0 5.5	0 5.8	0 6.1	0 6.3	0 6.6		23 50
	20	0 9.0	0 9.4	0 9.8	0 10.3	0 10.9	0 11.5	0 12.3	0 12.7	0 13.1		40
0 30	0 30	0 13.5	0 14.1	0 14.8	0 15.5	0 16.3	0 17.3	0 18.4	0 19.0	0 19.6	23 30	23 30
	40	0 18.0	0 18.8	0 19.6	0 20.6	0 21.7	0 23.0	0 24.4	0 25.2	0 26.1		20
	50	0 22.4	0 23.4	0 24.5	0 25.7	0 27.0	0 28.6	0 30.4	0 31.4	0 32.5		10
1 0	1 0	0 26.8	0 28.0	0 29.3	0 30.7	0 32.3	0 34.2	0 36.4	0 37.6	0 38.8	23 0	23 0

TABLE IV.

## AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H. A.	48°		50°		52°		54°		56°		58°		60°		61°		62°		Lat. H. A.
	h	m	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	
1 0	0	26.8	0	28.0	0	29.3	0	30.7	0	32.3	0	34.2	0	36.4	0	37.6	0	38.8	23 0
10	0	31.2	0	32.5	0	34.0	0	35.6	0	37.5	0	39.7	0	42.2	0	43.6	0	45.1	22 50
20	0	35.4	0	36.9	0	38.6	0	40.5	0	42.7	0	45.1	0	48.0	0	49.6	0	51.3	40
1 30	0	39.6	0	41.3	0	43.2	0	45.3	0	47.7	0	50.5	0	53.7	0	55.4	0	57.3	22 30
40	0	43.8	0	45.6	0	47.7	0	50.0	0	52.7	0	55.7	0	59.3	1	1.2	1	3.3	20
50	0	47.8	0	49.8	0	52.1	0	54.6	0	57.5	1	0.8	1	4.7	1	6.8	1	9.1	10
2 0	0	51.7	0	53.9	0	56.4	0	59.1	1	2.3	1	5.8	1	10.0	1	12.3	1	14.7	22 0
10	0	55.5	0	57.9	1	0.5	1	3.5	1	6.9	1	10.7	1	15.1	1	17.6	1	20.2	21 50
20	0	59.3	1	1.8	1	4.6	1	7.7	1	11.3	1	15.4	1	20.1	1	22.8	1	25.6	40
2 30	1	2.9	1	5.5	1	8.5	1	11.9	1	15.7	1	20.0	1	25.0	1	27.8	1	30.7	21 30
40	1	6.3	1	9.1	1	12.3	1	15.8	1	19.8	1	24.4	1	29.7	1	32.6	1	35.7	20
50	1	9.7	1	12.6	1	15.9	1	19.6	1	23.8	1	28.6	1	34.1	1	37.2	1	40.5	10
3 0	1	12.9	1	16.0	1	19.4	1	23.3	1	27.7	1	32.7	1	38.4	1	41.6	1	45.0	21 0
10	1	15.9	1	19.1	1	22.7	1	26.8	1	31.3	1	36.5	1	42.5	1	45.8	1	49.4	20 50
20	1	18.8	1	22.2	1	25.9	1	30.1	1	34.8	1	40.2	1	46.4	1	49.8	1	53.5	40
3 30	1	21.6	1	25.0	1	28.9	1	33.2	1	38.1	1	43.6	1	50.0	1	53.6	1	57.4	20 30
40	1	24.2	1	27.7	1	31.7	1	36.1	1	41.2	1	46.9	1	53.5	1	57.1	2	1.0	20
50	1	26.6	1	30.2	1	34.3	1	38.9	1	44.0	1	49.9	1	56.7	2	0.4	2	4.5	10
4 0	1	28.9	1	32.6	1	36.7	1	41.4	1	46.7	1	52.7	1	59.7	2	3.5	2	7.6	20 0
10	1	31.0	1	34.7	1	39.0	1	43.8	1	49.2	1	55.3	2	2.4	2	6.3	2	10.5	19 50
20	1	32.9	1	36.7	1	41.0	1	45.9	1	51.4	1	57.7	2	4.9	2	8.9	2	13.2	40
4 30	1	34.6	1	38.5	1	42.9	1	47.9	1	53.5	1	59.8	2	7.1	2	11.2	2	15.5	19 30
40	1	36.1	1	40.1	1	44.6	1	49.6	1	55.3	2	1.7	2	9.1	2	13.2	2	17.6	20
50	1	37.4	1	41.5	1	46.0	1	51.1	1	56.9	2	3.4	2	10.9	2	15.0	2	19.5	10
5 0	1	38.6	1	42.7	1	47.3	1	52.4	1	58.2	2	4.8	2	12.3	2	16.5	2	21.0	19 0
10	1	39.6	1	43.7	1	48.3	1	53.5	1	59.3	2	6.0	2	13.6	2	17.8	2	22.3	18 50
20	1	40.3	1	44.5	1	49.1	1	54.3	2	0.2	2	6.9	2	14.5	2	18.8	2	23.3	40
5 30	1	40.9	1	45.1	1	49.7	1	55.0	2	0.9	2	7.6	2	15.2	2	19.5	2	24.1	18 30
40	1	41.3	1	45.5	1	50.1	1	55.4	2	1.3	2	8.0	2	15.7	2	19.9	2	24.5	20
50	1	41.5	1	45.7	1	50.3	1	55.6	2	1.5	2	8.2	2	15.9	2	20.1	2	24.7	10
6 0	1	41.5	1	45.7	1	50.3	1	55.6	2	1.5	2	8.2	2	15.8	2	20.0	2	24.6	18 0
10	1	41.3	1	45.4	1	50.1	1	55.3	2	1.2	2	7.9	2	15.5	2	19.7	2	24.2	17 50
20	1	40.9	1	45.0	1	49.6	1	54.8	2	0.7	2	7.3	2	14.9	2	19.1	2	23.6	40
6 30	1	40.3	1	44.4	1	49.0	1	54.2	2	0.0	2	6.5	2	14.0	2	18.2	2	22.7	17 30
40	1	39.6	1	43.6	1	48.2	1	53.3	1	59.0	2	5.5	2	12.9	2	17.0	2	21.5	20
50	1	38.6	1	42.6	1	47.1	1	52.1	1	57.8	2	4.3	2	11.6	2	15.6	2	20.0	10
7 0	1	37.5	1	41.4	1	45.9	1	50.8	1	56.4	2	2.8	2	10.0	2	14.0	2	18.3	17 0
10	1	36.2	1	40.0	1	44.4	1	49.3	1	54.8	2	1.1	2	8.2	2	12.1	2	16.4	16 50
20	1	34.7	1	38.5	1	42.8	1	47.6	1	53.0	1	59.1	2	6.1	2	10.0	2	14.2	40
7 30	1	33.0	1	36.7	1	40.9	1	45.6	1	51.0	1	57.0	2	3.8	2	7.6	2	11.7	16 30
40	1	31.1	1	34.8	1	38.9	1	43.5	1	48.7	1	54.6	2	1.3	2	5.0	2	9.0	20
50	1	29.1	1	32.7	1	36.7	1	41.2	1	46.3	1	52.0	1	58.6	2	2.2	2	6.1	10
8 0	1	26.9	1	30.4	1	34.3	1	38.7	1	43.6	1	49.2	1	55.6	1	59.2	2	3.0	16 0
10	1	24.6	1	28.0	1	31.8	1	36.0	1	40.8	1	46.3	1	52.5	1	55.9	1	59.6	15 50
20	1	22.1	1	25.4	1	29.1	1	33.2	1	37.8	1	43.1	1	49.1	1	52.4	1	56.0	40
8 30	1	19.4	1	22.6	1	26.2	1	30.2	1	34.6	1	39.7	1	45.5	1	48.7	1	52.2	15 30
40	1	16.7	1	19.7	1	23.1	1	27.0	1	31.3	1	36.2	1	41.8	1	44.9	1	48.2	20
50	1	13.7	1	16.7	1	19.9	1	23.6	1	27.8	1	32.5	1	37.9	1	40.8	1	44.0	10
9 0	1	10.7	1	13.5	1	16.6	1	20.1	1	24.1	1	28.6	1	33.8	1	36.6	1	39.7	15 0
10	1	7.5	1	10.2	1	13.1	1	16.5	1	20.3	1	24.6	1	29.5	1	32.2	1	35.1	14 50
20	1	4.1	1	6.7	1	9.5	1	12.7	1	16.3	1	20.4	1	25.1	1	27.6	1	30.4	40
9 30	1	0.7	1	3.1	1	5.8	1	8.8	1	12.2	1	16.1	1	20.5	1	22.9	1	25.5	14 30
40	0	57.2	0	59.4	1	2.0	1	4.8	1	8.0	1	11.6	1	15.8	1	18.1	1	20.5	20
50	0	53.5	0	55.6	0	58.0	1	0.7	1	3.6	1	7.0	1	10.9	1	13.1	1	15.4	10
10 0	0	49.8	0	51.8	0	53.9	0	56.4	0	59.2	1	2.3	1	6.0	1	8.0	1	10.1	14 0

## AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H.A.	48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. H.A.
h m	.	.	.	.	.	.	.	.	.	h m
10 0	0 49.8	0 51.8	0 53.9	0 56.4	0 59.2	1 2.3	1 6.0	1 8.0	1 10.1	14 0
10 10	0 46.0	0 47.8	0 49.8	0 52.1	0 54.6	0 57.5	1 0.9	1 2.7	1 4.7	13 50
10 20	0 42.1	0 43.7	0 45.6	0 47.6	0 50.0	0 52.6	0 55.7	0 57.4	0 59.2	40
10 30	0 38.1	0 39.6	0 41.2	0 43.1	0 45.2	0 47.6	0 50.4	0 51.9	0 53.5	13 30
10 40	0 34.0	0 35.3	0 36.8	0 38.5	0 40.4	0 42.5	0 45.0	0 46.4	0 47.8	20
10 50	0 29.9	0 31.1	0 32.4	0 33.8	0 35.5	0 37.4	0 39.6	0 40.7	0 42.0	10
11 0	0 25.7	0 26.7	0 27.9	0 29.1	0 30.5	0 32.2	0 34.0	0 35.0	0 36.1	13 0
11 10	0 21.5	0 22.3	0 23.3	0 24.3	0 25.5	0 26.9	0 28.5	0 29.3	0 30.2	12 50
11 20	0 17.2	0 17.9	0 18.7	0 19.5	0 20.5	0 21.6	0 22.8	0 23.5	0 24.2	40
11 30	0 13.0	0 13.5	0 14.0	0 14.7	0 15.4	0 16.2	0 17.2	0 17.7	0 18.2	12 30
11 40	0 8.6	0 9.0	0 9.4	0 9.8	0 10.3	0 10.8	0 11.5	0 11.8	0 12.2	20
11 50	0 4.3	0 4.5	0 4.7	0 4.9	0 5.1	0 5.4	0 5.7	0 5.9	0 6.1	10
12 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12 0

Lat. H.A.	62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. H.A.
h m	.	.	.	.	.	.	.	.	.	h m
0 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24 0
0 10	0 6.6	0 6.8	0 7.0	0 7.3	0 7.6	0 8.0	0 8.3	0 8.7	0 9.2	23 50
0 20	0 13.1	0 13.6	0 14.1	0 14.6	0 15.2	0 15.9	0 16.6	0 17.4	0 18.3	40
0 30	0 19.6	0 20.3	0 21.1	0 21.9	0 22.8	0 23.8	0 24.9	0 26.1	0 27.4	23 30
0 40	0 26.1	0 27.0	0 28.0	0 29.1	0 30.3	0 31.6	0 33.1	0 34.7	0 36.4	20
0 50	0 32.5	0 33.7	0 34.9	0 36.3	0 37.8	0 39.4	0 41.2	0 43.2	0 45.4	10
1 0	0 38.8	0 40.2	0 41.7	0 43.4	0 45.2	0 47.1	0 49.2	0 51.6	0 54.2	23 0
1 10	0 45.1	0 46.7	0 48.5	0 50.4	0 52.4	0 54.7	0 57.2	0 59.9	1 3.0	22 50
1 20	0 51.3	0 53.1	0 55.1	0 57.2	0 59.6	1 2.2	1 5.0	1 8.1	1 11.6	40
1 30	0 57.3	0 59.4	1 1.6	1 4.0	1 6.6	1 9.5	1 12.7	1 16.1	1 20.0	22 30
1 40	1 3.3	1 5.5	1 8.0	1 10.6	1 13.5	1 16.7	1 20.2	1 24.0	1 28.2	20
1 50	1 9.1	1 11.5	1 14.2	1 17.1	1 20.2	1 23.7	1 27.5	1 31.7	1 36.3	10
2 0	1 14.7	1 17.4	1 20.3	1 23.4	1 26.8	1 30.5	1 34.6	1 39.2	1 44.2	22 0
2 10	1 20.2	1 23.1	1 26.2	1 29.5	1 33.2	1 37.2	1 41.6	1 46.4	1 51.8	21 50
2 20	1 25.6	1 28.6	1 31.9	1 35.5	1 39.4	1 43.6	1 48.3	1 53.5	1 59.2	40
2 30	1 30.7	1 33.9	1 37.4	1 41.2	1 45.3	1 49.8	1 54.8	2 0.2	2 6.3	21 30
2 40	1 35.7	1 39.1	1 42.7	1 46.7	1 51.1	1 55.8	2 1.0	2 6.8	2 13.1	20
2 50	1 40.5	1 44.0	1 47.8	1 52.0	1 56.6	2 1.6	2 7.0	2 13.0	2 19.7	10
3 0	1 45.0	1 48.7	1 52.7	1 57.1	2 1.9	2 7.1	2 12.7	2 19.0	2 26.0	21 0
3 10	1 49.4	1 53.2	1 57.4	2 1.9	2 6.9	2 12.3	2 18.2	2 24.7	2 31.9	20 50
3 20	1 53.5	1 57.5	2 1.8	2 6.5	2 11.6	2 17.2	2 23.3	2 30.1	2 37.5	40
3 30	1 57.4	2 1.5	2 6.0	2 10.8	2 16.1	2 21.9	2 28.2	2 35.1	2 42.8	20 30
3 40	2 1.0	2 5.3	2 9.9	2 14.9	2 20.3	2 26.2	2 32.7	2 39.9	2 47.8	20
3 50	2 4.5	2 8.8	2 13.5	2 18.6	2 24.2	2 30.3	2 37.0	2 44.3	2 52.4	10
4 0	2 7.6	2 12.1	2 16.9	2 22.1	2 27.8	2 34.0	2 40.9	2 48.4	2 56.6	20 0
4 10	2 10.5	2 15.1	2 20.0	2 25.3	2 31.1	2 37.5	2 44.4	2 52.1	3 0.5	19 50
4 20	2 13.2	2 17.8	2 22.8	2 28.2	2 34.1	2 40.6	2 47.7	2 55.5	3 4.0	40
4 30	2 15.5	2 20.2	2 25.3	2 30.8	2 36.8	2 43.4	2 50.6	2 58.5	3 7.2	19 30
4 40	2 17.6	2 22.4	2 27.5	2 33.1	2 39.2	2 45.9	2 53.1	3 1.1	3 10.0	20
4 50	2 19.5	2 24.3	2 29.5	2 35.2	2 41.3	2 48.0	2 55.4	3 3.4	3 12.4	10
5 0	2 21.0	2 25.9	2 31.2	2 36.9	2 43.1	2 49.8	2 57.2	3 5.4	3 14.4	19 0
5 10	2 22.3	2 27.2	2 32.5	2 38.2	2 44.5	2 51.3	2 58.8	3 7.0	3 16.0	18 50
5 20	2 23.3	2 28.2	2 33.6	2 39.3	2 45.6	2 52.5	2 59.9	3 8.2	3 17.2	40
5 30	2 24.1	2 29.0	2 34.3	2 40.1	2 46.4	2 53.3	3 0.8	3 9.0	3 18.1	18 30
5 40	2 24.5	2 29.5	2 34.8	2 40.6	2 46.9	2 53.7	3 1.2	3 9.5	3 18.6	20
5 50	2 24.7	2 29.6	2 35.0	2 40.8	2 47.0	2 53.9	3 1.4	3 9.6	3 18.7	10
6 0	2 24.6	2 29.5	2 34.8	2 40.6	2 46.9	2 53.7	3 1.2	3 9.4	3 18.4	18 0

TABLE IV.

701

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1917.

[For hour angles 0<sup>h</sup> to 12<sup>h</sup> the star is west of north, and for hour angles 12<sup>h</sup> to 24<sup>h</sup> it is east of north.]

Lat. H. A.		62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. H. A.	
h m		° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	h m	
6	0	2 24.6	2 29.5	2 34.8	2 40.6	2 46.9	2 53.7	3 1.2	3 9.4	3 18.4	18	0
	10	2 24.2	2 29.1	2 34.4	2 40.2	2 46.4	2 53.2	3 0.6	3 8.7	3 17.7		50
	20	2 23.6	2 28.5	2 33.7	2 39.4	2 45.6	2 52.3	2 59.7	3 7.8	3 16.7		40
6	30	2 22.7	2 27.5	2 32.7	2 38.4	2 44.5	2 51.2	2 58.5	3 6.5	3 15.3	17	30
	40	2 21.5	2 26.3	2 31.4	2 37.0	2 43.1	2 49.7	2 56.9	3 4.8	3 13.5		20
	50	2 20.0	2 24.8	2 29.9	2 35.4	2 41.4	2 47.9	2 55.0	3 2.8	3 11.4		10
7	0	2 18.3	2 23.0	2 28.0	2 33.5	2 39.4	2 45.8	2 52.8	3 0.5	3 9.0	17	0
	10	2 16.4	2 21.0	2 25.9	2 31.3	2 37.1	2 43.4	2 50.3	2 57.8	3 6.2		50
	20	2 14.2	2 18.7	2 23.5	2 28.8	2 34.5	2 40.7	2 47.4	2 54.9	3 3.0		40
7	30	2 11.7	2 16.1	2 20.9	2 26.0	2 31.6	2 37.7	2 44.3	2 51.6	2 59.6	16	30
	40	2 9.0	2 13.3	2 18.0	2 23.0	2 28.5	2 34.4	2 40.9	2 48.0	2 55.8		20
	50	2 6.1	2 10.3	2 14.8	2 19.7	2 25.1	2 30.8	2 37.2	2 44.1	2 51.7		10
8	0	2 3.0	2 7.1	2 11.5	2 16.2	2 21.4	2 27.0	2 33.2	2 39.9	2 47.3	16	0
	10	1 59.6	2 3.6	2 7.8	2 12.5	2 17.5	2 23.0	2 28.9	2 35.4	2 42.6		50
	20	1 56.0	1 59.8	2 4.0	2 8.5	2 13.3	2 18.6	2 24.4	2 30.7	2 37.6		40
8	30	1 52.2	1 55.9	1 59.9	2 4.2	2 8.9	2 14.0	2 19.6	2 25.7	2 32.4	15	30
	40	1 48.2	1 51.8	1 55.6	1 59.8	2 4.3	2 9.2	2 14.6	2 20.5	2 26.9		20
	50	1 44.0	1 47.5	1 51.2	1 55.2	1 59.5	2 4.2	2 9.4	2 15.0	2 21.2		10
9	0	1 39.7	1 42.9	1 46.5	1 50.3	1 54.5	1 59.0	2 3.9	2 9.3	2 15.2	15	0
	10	1 35.1	1 38.2	1 41.6	1 45.3	1 49.2	1 53.5	1 58.2	2 3.3	2 8.9		50
	20	1 30.4	1 33.4	1 36.6	1 40.0	1 43.8	1 47.9	1 52.3	1 57.2	2 2.5		40
9	30	1 25.5	1 28.3	1 31.4	1 34.6	1 38.2	1 42.0	1 46.2	1 50.8	1 55.9	14	30
	40	1 20.5	1 23.1	1 26.0	1 29.1	1 32.4	1 36.0	1 40.0	1 44.3	1 49.0		20
	50	1 15.4	1 17.8	1 20.5	1 23.4	1 26.5	1 29.9	1 33.6	1 37.6	1 42.0		10
10	0	1 10.1	1 12.4	1 14.8	1 17.5	1 20.4	1 23.5	1 27.0	1 30.7	1 34.8	14	0
	10	1 4.7	1 6.8	1 9.1	1 11.5	1 14.2	1 17.1	1 20.2	1 23.7	1 27.5		50
	20	0 59.2	1 1.1	1 3.2	1 5.4	1 7.8	1 10.5	1 13.4	1 16.5	1 20.0		40
10	30	0 53.5	0 55.3	0 57.2	0 59.2	1 1.4	1 3.8	1 6.4	1 9.2	1 12.4	13	30
	40	0 47.8	0 49.4	0 51.1	0 52.9	0 54.8	0 57.0	0 59.3	1 1.8	1 4.6		20
	50	0 42.0	0 43.4	0 44.9	0 46.5	0 48.2	0 50.1	0 52.1	0 54.3	0 56.8		10
11	0	0 36.1	0 37.3	0 38.6	0 40.0	0 41.5	0 43.1	0 44.8	0 46.7	0 48.8	13	0
	10	0 30.2	0 31.2	0 32.3	0 33.4	0 34.7	0 36.0	0 37.5	0 39.1	0 40.8		50
	20	0 24.2	0 25.0	0 25.9	0 26.8	0 27.8	0 28.9	0 30.0	0 31.3	0 32.7		40
11	30	0 18.2	0 18.8	0 19.4	0 20.1	0 20.9	0 21.7	0 22.6	0 23.5	0 24.6	12	30
	40	0 12.2	0 12.6	0 13.0	0 13.4	0 13.9	0 14.5	0 15.1	0 15.7	0 16.4		20
	50	0 6.1	0 6.3	0 6.5	0 6.7	0 7.0	0 7.2	0 7.5	0 7.9	0 8.2		10
12	0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12	0

TABLE IVa.

Table IV has been computed for a declination of 88° 52' 5". For other declinations of Polaris the correction given below should be applied to the Azimuth taken from Table IV.

Azimuth. Decl.		0'	20'	40'	60'	80'	100'	120'	140'	160'	180'	200'	Azimuth. Decl.	
° ' "		'	'	'	'	'	'	'	'	'	'	'	° ' "	
88 51	40	0.0	+0.1	+0.2	+0.4	+0.5	+0.6	+0.7	+0.8	+1.0	+1.1	+1.2	88 51	40
	45	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		45
88 51	50	0.0	+0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88 51	50
	55	0.0	0.0	+0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5		55
88 52	0	0.0	0.0	0.0	+0.1	+0.1	+0.1	+0.1	+0.2	+0.2	+0.2	+0.2	88 52	0
	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		5
88 52	10	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	88 52	10
	15	0.0	0.0	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5		15
88 52	20	0.0	-0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88 52	20
	25	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		25
88 52	30	0.0	-0.1	-0.2	-0.4	-0.5	-0.6	-0.7	-0.8	-1.0	-1.1	-1.2	88 52	30



## AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.							Variation for—	
	88° 51' 40"	88° 51' 50"	88° 52' 0"	88° 52' 10"	88° 52' 20"	88° 52' 30"	1" of Lat.	1" of $\delta$ .
• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	• ' "	"	"
10 0	1 9 23.3	1 9 13.1	1 9 2.9	1 8 52.8	1 8 42.6	1 8 32.5	+0.21	-1.02
10 20	1 9 27.6	1 9 17.4	1 9 7.3	1 8 57.1	1 8 46.9	1 8 36.8	0.22	1.02
10 40	1 9 32.1	1 9 21.9	1 9 11.8	1 9 1.6	1 8 51.4	1 8 41.2	0.23	1.02
11 0	1 9 36.8	1 9 26.6	1 9 16.4	1 9 6.2	1 8 56.0	1 8 45.8	0.24	1.02
11 20	1 9 41.6	1 9 31.4	1 9 21.2	1 9 11.0	1 9 0.8	1 8 50.6	0.24	1.02
11 40	1 9 46.5	1 9 36.3	1 9 26.1	1 9 15.9	1 9 5.7	1 8 55.5	+0.25	-1.02
12 0	1 9 51.6	1 9 41.4	1 9 31.2	1 9 20.9	1 9 10.7	1 9 0.5	0.26	1.02
12 20	1 9 56.9	1 9 46.6	1 9 36.4	1 9 26.2	1 9 15.9	1 9 5.7	0.27	1.02
12 40	1 10 2.3	1 9 52.0	1 9 41.8	1 9 31.5	1 9 21.3	1 9 11.0	0.27	1.03
13 0	1 10 7.9	1 9 57.6	1 9 47.3	1 9 37.1	1 9 26.8	1 9 16.5	0.28	1.03
13 20	1 10 13.6	1 10 3.3	1 9 53.0	1 9 42.8	1 9 32.5	1 9 22.2	+0.29	-1.03
13 40	1 10 19.5	1 10 9.2	1 9 58.9	1 9 48.6	1 9 38.3	1 9 28.0	0.30	1.03
14 0	1 10 25.5	1 10 15.2	1 10 4.9	1 9 54.6	1 9 44.3	1 9 34.0	0.30	1.03
14 20	1 10 31.7	1 10 21.4	1 10 11.1	1 10 0.8	1 9 50.5	1 9 40.1	0.31	1.03
14 40	1 10 38.1	1 10 27.8	1 10 17.4	1 10 7.1	1 9 56.8	1 9 46.4	0.32	1.03
15 0	1 10 44.6	1 10 34.3	1 10 23.9	1 10 13.6	1 10 3.2	1 9 52.9	+0.33	-1.03
15 20	1 10 51.4	1 10 41.0	1 10 30.6	1 10 20.2	1 10 9.9	1 9 59.5	0.34	1.04
15 40	1 10 58.2	1 10 47.8	1 10 37.4	1 10 27.1	1 10 16.7	1 10 6.3	0.34	1.04
16 0	1 11 5.2	1 10 54.8	1 10 44.4	1 10 34.0	1 10 23.6	1 10 13.2	0.35	1.04
16 20	1 11 12.4	1 11 2.0	1 10 51.6	1 10 41.2	1 10 30.8	1 10 20.3	0.36	1.04
16 40	1 11 19.8	1 11 9.4	1 10 58.9	1 10 48.5	1 10 38.1	1 10 27.6	+0.37	-1.04
17 0	1 11 27.4	1 11 16.9	1 11 6.4	1 10 56.0	1 10 45.5	1 10 35.1	0.38	1.05
17 20	1 11 35.1	1 11 24.6	1 11 14.1	1 11 3.6	1 10 53.2	1 10 42.7	0.39	1.05
17 40	1 11 43.0	1 11 32.5	1 11 22.0	1 11 11.5	1 11 1.0	1 10 50.5	0.40	1.05
18 0	1 11 51.0	1 11 40.5	1 11 30.0	1 11 19.5	1 11 9.0	1 10 58.5	0.40	1.05
18 20	1 11 59.3	1 11 48.7	1 11 38.2	1 11 27.7	1 11 17.1	1 11 6.8	+0.41	-1.05
18 40	1 12 7.7	1 11 57.1	1 11 46.6	1 11 36.0	1 11 25.5	1 11 14.9	0.42	1.06
19 0	1 12 16.3	1 12 5.7	1 11 55.1	1 11 44.5	1 11 34.0	1 11 23.4	0.43	1.06
19 20	1 12 25.1	1 12 14.5	1 12 3.9	1 11 53.3	1 11 42.7	1 11 32.1	0.44	1.06
19 40	1 12 34.0	1 12 23.4	1 12 12.8	1 12 2.2	1 11 51.5	1 11 40.9	0.45	1.06
20 0	1 12 43.2	1 12 32.5	1 12 21.9	1 12 11.2	1 12 0.6	1 11 50.0	+0.46	-1.06
20 20	1 12 52.5	1 12 41.8	1 12 31.2	1 12 20.5	1 12 9.8	1 11 59.2	0.47	1.07
20 40	1 13 2.0	1 12 51.3	1 12 40.7	1 12 30.0	1 12 19.3	1 12 8.6	0.48	1.07
21 0	1 13 11.7	1 13 1.0	1 12 50.3	1 12 39.6	1 12 28.9	1 12 18.2	0.49	1.07
21 20	1 13 21.6	1 13 10.9	1 13 0.2	1 12 49.4	1 12 38.7	1 12 28.0	0.50	1.07
21 40	1 13 31.7	1 13 21.0	1 13 10.2	1 12 59.5	1 12 48.7	1 12 37.9	+0.51	-1.08
22 0	1 13 42.0	1 13 31.2	1 13 20.5	1 13 9.7	1 12 58.9	1 12 48.1	0.52	1.08
22 20	1 13 52.5	1 13 41.7	1 13 30.9	1 13 20.1	1 13 9.3	1 12 58.5	0.53	1.08
22 40	1 14 3.2	1 13 52.4	1 13 41.6	1 13 30.7	1 13 19.9	1 13 9.0	0.54	1.08
23 0	1 14 14.1	1 14 3.3	1 13 52.4	1 13 41.5	1 13 30.7	1 13 19.8	0.55	1.09
23 20	1 14 25.2	1 14 14.3	1 14 3.4	1 13 52.6	1 13 41.7	1 13 30.8	+0.56	-1.09
23 40	1 14 36.5	1 14 25.6	1 14 14.7	1 14 3.8	1 13 52.9	1 13 42.0	0.57	1.09
24 0	1 14 48.1	1 14 37.1	1 14 26.2	1 14 15.2	1 14 4.3	1 13 53.3	0.58	1.10
24 20	1 14 59.8	1 14 48.8	1 14 37.9	1 14 26.9	1 14 15.9	1 14 4.9	0.59	1.10
24 40	1 15 11.8	1 15 0.8	1 14 49.7	1 14 38.7	1 14 27.7	1 14 16.7	0.60	1.10
25 0	1 15 23.9	1 15 12.9	1 15 1.8	1 14 50.8	1 14 39.8	1 14 28.7	+0.61	-1.10
25 20	1 15 36.3	1 15 25.2	1 15 14.2	1 15 3.1	1 14 52.0	1 14 41.0	0.62	1.11
25 40	1 15 48.9	1 15 37.8	1 15 26.7	1 15 15.6	1 15 4.5	1 14 53.4	0.63	1.11
26 0	1 16 1.7	1 15 50.6	1 15 39.5	1 15 28.4	1 15 17.2	1 15 6.1	0.64	1.11
26 20	1 16 14.8	1 16 3.6	1 15 52.5	1 15 41.3	1 15 30.2	1 15 19.0	0.65	1.12
26 40	1 16 28.1	1 16 16.9	1 16 5.7	1 15 54.5	1 15 43.3	1 15 32.1	+0.67	-1.12
27 0	1 16 41.6	1 16 30.4	1 16 19.2	1 16 7.9	1 15 56.7	1 15 45.5	0.68	1.12
27 20	1 16 55.4	1 16 44.1	1 16 32.9	1 16 21.6	1 16 10.3	1 15 59.1	0.69	1.13
27 40	1 17 9.4	1 16 58.1	1 16 46.8	1 16 35.5	1 16 24.2	1 16 12.9	0.70	1.13
28 0	1 17 23.6	1 17 12.3	1 17 1.0	1 16 49.6	1 16 38.3	1 16 27.0	0.71	1.13
28 20	1 17 38.1	1 17 26.8	1 17 15.4	1 17 4.0	1 16 52.7	1 16 41.3	+0.73	-1.14
28 40	1 17 52.8	1 17 41.5	1 17 30.1	1 17 18.7	1 17 7.3	1 16 55.9	0.74	1.14
29 0	1 18 7.8	1 17 56.4	1 17 45.0	1 17 33.5	1 17 22.1	1 17 10.7	0.75	1.14
29 20	1 18 23.1	1 18 11.6	1 18 0.2	1 17 48.7	1 17 37.2	1 17 25.7	0.76	1.15
29 40	1 18 38.6	1 18 27.1	1 18 15.6	1 18 4.1	1 17 52.6	1 17 41.0	0.78	1.15
30 0	1 18 54.4	1 18 42.8	1 18 31.3	1 18 19.7	1 18 8.2	1 17 56.6	+0.79	-1.16

## AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.							Variation for—	
	88° 51' 40"	88° 51' 50"	88° 52' 0"	88° 52' 10"	88° 52' 20"	88° 52' 30"	1' of Lat.	1" of $\delta$ .
• /	• / "	• / "	• / "	• / "	• / "	• / "	"	"
30 0	1 18 54.4	1 18 42.8	1 18 31.3	1 18 19.7	1 18 8.2	1 17 56.6	+0.79	-1.16
30 10	1 19 2.4	1 18 50.8	1 18 39.2	1 18 27.7	1 18 16.1	1 18 4.5	0.80	1.16
30 20	1 19 10.4	1 18 58.8	1 18 47.2	1 18 35.7	1 18 24.1	1 18 12.5	0.80	1.16
30 30	1 19 18.5	1 19 6.9	1 18 55.3	1 18 43.7	1 18 32.1	1 18 20.5	0.81	1.16
30 40	1 19 26.7	1 19 15.1	1 19 3.5	1 18 51.8	1 18 40.2	1 18 28.6	0.82	1.16
30 50	1 19 35.0	1 19 23.3	1 19 11.7	1 19 0.0	1 18 48.4	1 18 36.8	+0.82	-1.16
31 0	1 19 43.3	1 19 31.6	1 19 20.0	1 19 8.3	1 18 56.6	1 18 45.0	0.83	1.17
31 10	1 19 51.7	1 19 40.0	1 19 28.3	1 19 16.6	1 19 4.9	1 18 53.3	0.84	1.17
31 20	1 20 0.2	1 19 48.5	1 19 36.8	1 19 25.0	1 19 13.3	1 19 1.6	0.85	1.17
31 30	1 20 8.7	1 19 57.0	1 19 45.3	1 19 33.5	1 19 21.8	1 19 10.1	0.85	1.17
31 40	1 20 17.3	1 20 5.6	1 19 53.8	1 19 42.1	1 19 30.3	1 19 18.6	+0.86	-1.17
31 50	1 20 26.0	1 20 14.2	1 20 2.5	1 19 50.7	1 19 38.9	1 19 27.2	0.87	1.18
32 0	1 20 34.8	1 20 23.0	1 20 11.2	1 19 59.4	1 19 47.6	1 19 35.8	0.87	1.18
32 10	1 20 43.6	1 20 31.8	1 20 19.9	1 20 8.1	1 19 56.3	1 19 44.5	0.88	1.18
32 20	1 20 52.5	1 20 40.6	1 20 28.8	1 20 17.0	1 20 5.1	1 19 53.3	0.89	1.18
32 30	1 21 1.5	1 20 49.6	1 20 37.7	1 20 25.9	1 20 14.0	1 20 2.2	+0.90	-1.19
32 40	1 21 10.5	1 20 58.6	1 20 46.7	1 20 34.9	1 20 23.0	1 20 11.1	0.90	1.19
32 50	1 21 19.6	1 21 7.7	1 20 55.8	1 20 43.9	1 20 32.0	1 20 20.1	0.91	1.19
33 0	1 21 28.8	1 21 16.9	1 21 5.0	1 20 53.1	1 20 41.1	1 20 29.2	0.92	1.19
33 10	1 21 38.1	1 21 26.2	1 21 14.2	1 21 2.3	1 20 50.3	1 20 38.4	0.92	1.19
33 20	1 21 47.4	1 21 35.5	1 21 23.5	1 21 11.5	1 20 59.6	1 20 47.6	+0.93	-1.20
33 30	1 21 56.9	1 21 44.9	1 21 32.9	1 21 20.9	1 21 8.9	1 20 56.9	0.94	1.20
33 40	1 22 6.4	1 21 54.4	1 21 42.4	1 21 30.3	1 21 18.3	1 21 6.8	0.95	1.20
33 50	1 22 16.0	1 22 3.9	1 21 51.9	1 21 39.9	1 21 27.8	1 21 15.8	0.96	1.20
34 0	1 22 25.6	1 22 13.6	1 22 1.5	1 21 49.5	1 21 37.4	1 21 25.3	0.96	1.21
34 10	1 22 35.4	1 22 23.3	1 22 11.2	1 21 59.1	1 21 47.0	1 21 34.9	+0.97	-1.21
34 20	1 22 45.2	1 22 33.1	1 22 21.0	1 22 8.9	1 21 56.8	1 21 44.6	0.98	1.21
34 30	1 22 55.1	1 22 43.0	1 22 30.9	1 22 18.7	1 22 6.6	1 21 54.4	0.99	1.21
34 40	1 23 5.1	1 22 53.0	1 22 40.8	1 22 28.6	1 22 16.5	1 22 4.3	1.00	1.22
34 50	1 23 15.2	1 23 3.0	1 22 50.8	1 22 38.6	1 22 26.5	1 22 14.3	1.00	1.22
35 0	1 23 25.3	1 23 13.1	1 23 0.9	1 22 48.7	1 22 36.5	1 22 24.3	+1.01	-1.22
35 10	1 23 35.6	1 23 23.4	1 23 11.1	1 22 58.9	1 22 46.6	1 22 34.4	1.02	1.22
35 20	1 23 45.9	1 23 33.6	1 23 21.4	1 23 9.1	1 22 56.9	1 22 44.6	1.03	1.23
35 30	1 23 56.3	1 23 44.0	1 23 31.7	1 23 19.5	1 23 7.2	1 22 54.9	1.04	1.23
35 40	1 24 6.8	1 23 54.5	1 23 42.2	1 23 29.9	1 23 17.6	1 23 5.3	1.05	1.23
35 50	1 24 17.4	1 24 5.0	1 23 52.7	1 23 40.4	1 23 28.0	1 23 15.7	+1.06	-1.23
36 0	1 24 28.0	1 24 15.7	1 24 3.3	1 23 51.0	1 23 38.6	1 23 26.2	1.06	1.24
36 10	1 24 38.8	1 24 26.4	1 24 14.0	1 24 1.6	1 23 49.3	1 23 36.9	1.07	1.24
36 20	1 24 49.6	1 24 37.2	1 24 24.8	1 24 12.4	1 24 0.0	1 23 47.6	1.08	1.24
36 30	1 25 0.6	1 24 48.2	1 24 35.7	1 24 23.3	1 24 10.8	1 23 58.4	1.09	1.24
36 40	1 25 11.6	1 24 59.2	1 24 46.7	1 24 34.2	1 24 21.7	1 24 9.3	+1.10	-1.25
36 50	1 25 22.7	1 25 10.2	1 24 57.7	1 24 45.2	1 24 32.7	1 24 20.2	1.11	1.25
37 0	1 25 34.0	1 25 21.4	1 25 8.9	1 24 56.4	1 24 43.9	1 24 31.3	1.12	1.25
37 10	1 25 45.2	1 25 32.7	1 25 20.1	1 25 7.6	1 24 55.1	1 24 42.5	1.13	1.25
37 20	1 25 56.6	1 25 44.1	1 25 31.5	1 25 18.9	1 25 6.3	1 24 53.8	1.14	1.26
37 30	1 26 8.1	1 25 55.5	1 25 42.9	1 25 30.3	1 25 17.7	1 25 5.1	+1.15	-1.26
37 40	1 26 19.7	1 26 7.1	1 25 54.5	1 25 41.8	1 25 29.2	1 25 16.5	1.16	1.26
37 50	1 26 31.4	1 26 18.7	1 26 6.1	1 25 53.4	1 25 40.8	1 25 28.1	1.16	1.27
38 0	1 26 43.2	1 26 30.5	1 26 17.8	1 26 5.1	1 25 52.4	1 25 39.7	1.17	1.27
38 10	1 26 55.1	1 26 42.3	1 26 29.6	1 26 16.9	1 26 4.2	1 25 51.5	1.18	1.27
38 20	1 27 7.0	1 26 54.3	1 26 41.5	1 26 28.8	1 26 16.0	1 26 3.3	+1.19	-1.27
38 30	1 27 19.1	1 27 6.3	1 26 53.5	1 26 40.8	1 26 28.0	1 26 15.2	1.20	1.28
38 40	1 27 31.3	1 27 18.5	1 27 5.7	1 26 52.9	1 26 40.0	1 26 27.2	1.21	1.28
38 50	1 27 43.6	1 27 30.7	1 27 17.9	1 27 5.0	1 26 52.2	1 26 39.4	1.22	1.28
39 0	1 27 55.9	1 27 43.1	1 27 30.2	1 27 17.3	1 27 4.5	1 26 51.6	1.23	1.29
39 10	1 28 8.4	1 27 55.5	1 27 42.6	1 27 29.7	1 27 16.8	1 27 3.9	+1.24	-1.29
39 20	1 28 21.0	1 28 8.1	1 27 55.1	1 27 42.2	1 27 29.3	1 27 16.4	1.26	1.29
39 30	1 28 33.7	1 28 20.7	1 28 7.8	1 27 54.8	1 27 41.9	1 27 28.9	1.27	1.30
39 40	1 28 46.5	1 28 33.5	1 28 20.5	1 28 7.5	1 27 54.5	1 27 41.5	1.28	1.30
39 50	1 28 59.4	1 28 46.4	1 28 33.4	1 28 20.3	1 28 7.3	1 27 54.3	1.29	1.30
40 0	1 29 12.4	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.2	1 28 7.1	+1.30	-1.30

## AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.	88° 51' 40"	88° 51' 50"	88° 52' 0"	88° 52' 10"	88° 52' 20"	88° 52' 30"	Variation for—	
							1' of Lat.	1' of Az.
•     "	•     "	•     "	•     "	•     "	•     "	•     "	•     "	•     "
40 0	1 29 12.4	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.2	1 28 7.1	+1.30	-1.31
40 10	1 29 25.5	1 29 12.4	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.1	1.31	1.31
40 20	1 29 38.8	1 29 25.7	1 29 12.5	1 28 59.4	1 28 46.3	1 28 33.2	1.32	1.31
40 30	1 29 52.1	1 29 39.0	1 29 25.8	1 29 12.7	1 28 59.5	1 28 46.4	1.33	1.31
40 40	1 30 5.6	1 29 52.4	1 29 39.2	1 29 26.0	1 29 12.8	1 28 59.6	1.34	1.32
40 50	1 30 19.1	1 30 5.9	1 29 52.7	1 29 39.5	1 29 26.3	1 29 13.0	+1.35	-1.32
41 0	1 30 32.8	1 30 19.6	1 30 6.3	1 29 53.1	1 29 39.8	1 29 26.6	1.37	1.32
41 10	1 30 46.6	1 30 33.3	1 30 20.1	1 30 6.8	1 29 53.5	1 29 40.2	1.38	1.33
41 20	1 31 0.5	1 30 47.2	1 30 33.9	1 30 20.6	1 30 7.3	1 29 53.9	1.39	1.33
41 30	1 31 14.6	1 31 1.2	1 30 47.9	1 30 34.5	1 30 21.2	1 30 7.8	1.40	1.34
41 40	1 31 28.7	1 31 15.3	1 31 2.0	1 30 48.6	1 30 35.2	1 30 21.8	+1.41	-1.34
41 50	1 31 43.0	1 31 29.6	1 31 16.2	1 31 2.7	1 30 49.3	1 30 35.9	1.42	1.34
42 0	1 31 57.4	1 31 43.9	1 31 30.5	1 31 17.0	1 31 3.6	1 30 50.1	1.43	1.35
42 10	1 32 11.9	1 31 58.4	1 31 44.9	1 31 31.4	1 31 17.9	1 31 4.4	1.45	1.35
42 20	1 32 26.5	1 32 13.0	1 31 59.5	1 31 46.0	1 31 32.4	1 31 18.9	1.46	1.35
42 30	1 32 41.3	1 32 27.7	1 32 14.2	1 32 0.6	1 31 47.0	1 31 33.5	+1.47	-1.36
42 40	1 32 56.2	1 32 42.6	1 32 29.0	1 32 15.4	1 32 1.8	1 31 48.2	1.48	1.36
42 50	1 33 11.2	1 32 57.6	1 32 43.9	1 32 30.3	1 32 16.7	1 32 3.0	1.50	1.36
43 0	1 33 26.4	1 33 12.7	1 32 59.0	1 32 45.3	1 32 31.7	1 32 18.0	1.51	1.37
43 10	1 33 41.6	1 33 27.9	1 33 14.2	1 33 0.5	1 32 46.8	1 32 33.1	1.52	1.37
43 20	1 33 57.0	1 33 43.3	1 33 29.5	1 33 15.8	1 33 2.0	1 32 48.3	+1.54	-1.37
43 30	1 34 12.6	1 33 58.8	1 33 45.0	1 33 31.2	1 33 17.4	1 33 3.6	1.55	1.38
43 40	1 34 28.3	1 34 14.4	1 34 0.6	1 33 46.8	1 33 33.0	1 33 19.1	1.56	1.38
43 50	1 34 44.1	1 34 30.2	1 34 16.3	1 34 2.5	1 33 48.6	1 33 34.7	1.58	1.39
44 0	1 35 0.0	1 34 46.1	1 34 32.2	1 34 18.3	1 34 4.4	1 33 50.5	1.59	1.39
44 10	1 35 16.1	1 35 2.2	1 34 48.2	1 34 34.3	1 34 20.3	1 34 6.4	+1.61	-1.39
44 20	1 35 32.3	1 35 18.4	1 35 4.4	1 34 50.4	1 34 36.4	1 34 22.4	1.62	1.40
44 30	1 35 48.7	1 35 34.7	1 35 20.7	1 35 6.6	1 34 52.6	1 34 38.6	1.63	1.40
44 40	1 36 5.2	1 35 51.2	1 35 37.1	1 35 23.0	1 35 9.0	1 34 54.9	1.64	1.41
44 50	1 36 21.9	1 36 7.8	1 35 53.6	1 35 39.5	1 35 25.4	1 35 11.3	1.66	1.41
45 0	1 36 38.7	1 36 24.5	1 36 10.4	1 35 56.2	1 35 42.1	1 35 27.9	+1.68	-1.42
45 10	1 36 55.6	1 36 41.4	1 36 27.2	1 36 13.0	1 35 58.9	1 35 44.7	1.69	1.42
45 20	1 37 12.7	1 36 58.5	1 36 44.2	1 36 30.0	1 36 15.8	1 36 1.6	1.71	1.42
45 30	1 37 29.9	1 37 15.7	1 37 1.4	1 36 47.1	1 36 32.9	1 36 18.6	1.72	1.43
45 40	1 37 47.3	1 37 33.0	1 37 18.7	1 37 4.4	1 36 50.1	1 36 35.8	1.74	1.43
45 50	1 38 4.9	1 37 50.5	1 37 36.2	1 37 21.8	1 37 7.5	1 36 53.1	+1.75	-1.44
46 0	1 38 22.6	1 38 8.2	1 37 53.8	1 37 39.4	1 37 25.0	1 37 10.6	1.77	1.44
46 10	1 38 40.5	1 38 26.0	1 38 11.6	1 37 57.1	1 37 42.7	1 37 28.3	1.78	1.44
46 20	1 38 58.5	1 38 44.0	1 38 29.5	1 38 15.0	1 38 0.5	1 37 46.1	1.80	1.45
46 30	1 39 16.7	1 39 2.1	1 38 47.6	1 38 33.1	1 38 18.5	1 38 4.0	1.82	1.45
46 40	1 39 35.0	1 39 20.4	1 39 5.9	1 38 51.3	1 38 36.7	1 38 22.1	+1.83	-1.46
46 50	1 39 53.5	1 39 38.9	1 39 24.3	1 39 9.7	1 38 55.0	1 38 40.4	1.85	1.46
47 0	1 40 12.2	1 39 57.5	1 39 42.9	1 39 28.2	1 39 13.5	1 38 58.9	1.86	1.47
47 10	1 40 31.0	1 40 16.3	1 40 1.6	1 39 46.9	1 39 32.2	1 39 17.5	1.88	1.47
47 20	1 40 50.1	1 40 35.3	1 40 20.5	1 40 5.8	1 39 51.0	1 39 36.3	1.90	1.48
47 30	1 41 9.2	1 40 54.4	1 40 39.6	1 40 24.8	1 40 10.0	1 39 55.2	+1.92	-1.48
47 40	1 41 28.6	1 41 13.8	1 40 58.9	1 40 44.0	1 40 29.2	1 40 14.3	1.93	1.49
47 50	1 41 48.1	1 41 33.2	1 41 18.3	1 41 3.4	1 40 48.5	1 40 33.6	1.95	1.49
48 0	1 42 7.8	1 41 52.9	1 41 38.0	1 41 23.0	1 41 8.1	1 40 53.1	1.97	1.49
48 10	1 42 27.7	1 42 12.8	1 41 57.8	1 41 42.8	1 41 27.8	1 41 12.8	1.98	1.50
48 20	1 42 47.8	1 42 32.8	1 42 17.7	1 42 2.7	1 41 47.6	1 41 32.6	+2.00	-1.50
48 30	1 43 8.1	1 42 53.0	1 42 37.9	1 42 22.8	1 42 7.7	1 41 52.6	2.02	1.51
48 40	1 43 28.5	1 43 13.4	1 42 58.2	1 42 43.1	1 42 27.9	1 42 12.8	2.04	1.51
48 50	1 43 49.2	1 43 34.0	1 43 18.8	1 43 3.6	1 42 48.4	1 42 33.2	2.06	1.52
49 0	1 44 10.0	1 43 54.7	1 43 39.5	1 43 24.2	1 43 9.0	1 42 53.8	2.08	1.52
49 10	1 44 31.0	1 44 15.7	1 44 0.4	1 43 45.1	1 43 29.8	1 43 14.5	+2.10	-1.53
49 20	1 44 52.2	1 44 36.9	1 44 21.5	1 44 6.2	1 43 50.8	1 43 35.5	2.12	1.53
49 30	1 45 13.6	1 44 58.2	1 44 42.8	1 44 27.4	1 44 12.0	1 43 56.6	2.14	1.54
49 40	1 45 35.2	1 45 19.8	1 45 4.3	1 44 48.9	1 44 33.4	1 44 18.0	2.16	1.54
49 50	1 45 57.0	1 45 41.5	1 45 26.0	1 45 10.5	1 44 55.0	1 44 39.5	2.18	1.55
50 0	1 46 19.1	1 46 3.5	1 45 47.9	1 45 32.4	1 45 16.8	1 45 1.3	+2.20	-1.56

TABLE V.

## AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.							Variation for—	
	88° 51' 40"	88° 51' 50"	88° 52' 0"	88° 52' 10"	88° 52' 20"	88° 52' 30"	1' of Lat.	1" of $\lambda$ .
50 0	1 46 19.1	1 46 3.5	1 45 47.9	1 45 32.4	1 45 16.8	1 45 1.3	+2.20	-1.56
50 10	1 46 41.3	1 46 25.7	1 46 10.1	1 45 54.4	1 45 38.8	1 45 23.2	2.22	1.56
50 20	1 47 3.7	1 46 48.1	1 46 32.4	1 46 16.7	1 46 1.1	1 45 45.4	2.24	1.57
50 30	1 47 26.4	1 47 10.6	1 46 54.9	1 46 39.2	1 46 23.5	1 46 7.7	2.26	1.57
50 40	1 47 49.2	1 47 33.5	1 47 17.7	1 47 1.9	1 46 46.1	1 46 30.3	2.28	1.58
50 50	1 48 12.3	1 47 56.5	1 47 40.6	1 47 24.8	1 47 9.0	1 46 53.1	+2.30	-1.58
51 0	1 48 35.6	1 48 19.7	1 48 3.8	1 47 47.9	1 47 32.0	1 47 16.1	2.33	1.59
51 10	1 48 59.1	1 48 43.2	1 48 27.2	1 48 11.3	1 47 55.3	1 47 39.4	2.35	1.59
51 20	1 49 22.9	1 49 6.9	1 48 50.9	1 48 34.9	1 48 18.9	1 48 2.9	2.37	1.60
51 30	1 49 46.9	1 49 30.8	1 49 14.7	1 48 58.7	1 48 42.6	1 48 26.5	2.39	1.61
51 40	1 50 11.1	1 49 55.0	1 49 38.8	1 49 22.7	1 49 6.6	1 48 50.4	+2.42	-1.61
51 50	1 50 35.5	1 50 19.4	1 50 3.2	1 49 47.0	1 49 30.8	1 49 14.6	2.44	1.62
52 0	1 51 0.2	1 50 44.0	1 50 27.7	1 50 11.5	1 49 55.2	1 49 39.0	2.46	1.62
52 10	1 51 25.1	1 51 8.8	1 50 52.5	1 50 36.2	1 50 19.9	1 50 3.6	2.49	1.63
52 20	1 51 50.3	1 51 34.0	1 51 17.6	1 51 1.2	1 50 44.8	1 50 28.5	2.51	1.64
52 30	1 52 15.7	1 51 59.3	1 51 42.9	1 51 26.4	1 51 10.0	1 50 53.6	+2.54	-1.64
52 40	1 52 41.4	1 52 24.9	1 52 8.4	1 51 51.9	1 51 35.4	1 51 18.9	2.56	1.65
52 50	1 53 7.3	1 52 50.8	1 52 34.2	1 52 17.7	1 52 1.1	1 51 44.5	2.59	1.66
53 0	1 53 33.5	1 53 16.9	1 53 0.3	1 52 43.6	1 52 27.0	1 52 10.4	2.61	1.66
53 10	1 54 0.0	1 53 43.3	1 53 26.6	1 53 9.9	1 52 53.2	1 52 36.5	2.64	1.67
53 20	1 54 26.7	1 54 9.9	1 53 53.2	1 53 36.4	1 53 19.7	1 53 2.9	+2.67	-1.68
53 30	1 54 53.6	1 54 36.8	1 54 20.0	1 54 3.2	1 53 46.4	1 53 29.6	2.69	1.68
53 40	1 55 20.9	1 55 4.0	1 54 47.1	1 54 30.2	1 54 13.4	1 53 56.5	2.72	1.69
53 50	1 55 48.4	1 55 31.5	1 55 14.5	1 54 57.6	1 54 40.6	1 54 23.7	2.75	1.69
54 0	1 56 16.2	1 55 59.2	1 55 42.2	1 55 25.1	1 55 8.1	1 54 51.1	2.78	1.70
54 10	1 56 44.3	1 56 27.2	1 56 10.1	1 55 53.0	1 55 35.9	1 55 18.8	+2.80	-1.71
54 20	1 57 12.7	1 56 55.5	1 56 38.3	1 56 21.2	1 56 4.0	1 55 46.9	2.83	1.72
54 30	1 57 41.3	1 57 24.1	1 57 6.9	1 56 49.6	1 56 32.4	1 56 15.2	2.86	1.72
54 40	1 58 10.3	1 57 53.0	1 57 35.7	1 57 18.4	1 57 1.1	1 56 43.8	2.89	1.73
54 50	1 58 39.5	1 58 22.2	1 58 4.8	1 57 47.4	1 57 30.1	1 57 12.7	2.92	1.74
55 0	1 59 9.1	1 58 51.6	1 58 34.2	1 58 16.8	1 57 59.3	1 57 41.9	+2.95	-1.74
55 10	1 59 39.0	1 59 21.4	1 59 3.9	1 58 46.4	1 58 28.9	1 58 11.4	2.98	1.75
55 20	2 0 9.1	1 59 51.6	1 59 34.0	1 59 16.4	1 58 58.8	1 58 41.2	3.01	1.76
55 30	2 0 39.6	2 0 22.0	2 0 4.3	1 59 46.6	1 59 29.0	1 59 11.4	3.04	1.76
55 40	2 1 10.4	2 0 52.7	2 0 35.0	2 0 17.2	1 59 59.5	1 59 41.8	3.08	1.77
55 50	2 1 41.6	2 1 23.8	2 1 6.0	2 0 48.1	2 0 30.3	2 0 12.5	+3.11	-1.78
56 0	2 2 13.1	2 1 55.2	2 1 37.3	2 1 19.4	2 1 1.5	2 0 43.6	3.14	1.79
56 10	2 2 44.9	2 2 26.9	2 2 8.9	2 1 51.0	2 1 33.0	2 1 15.0	3.18	1.80
56 20	2 3 17.0	2 2 59.0	2 2 40.9	2 2 22.9	2 2 4.8	2 1 46.8	3.21	1.80
56 30	2 3 49.5	2 3 31.4	2 3 13.2	2 2 55.1	2 2 37.0	2 2 18.9	3.24	1.81
56 40	2 4 22.3	2 4 4.1	2 3 45.9	2 3 27.7	2 3 9.5	2 2 51.3	+3.28	-1.82
56 50	2 4 55.5	2 4 37.2	2 4 19.0	2 4 0.7	2 3 42.4	2 3 24.1	3.32	1.83
57 0	2 5 29.1	2 5 10.7	2 4 52.4	2 4 34.0	2 4 15.6	2 3 57.2	3.35	1.84
57 10	2 6 3.0	2 5 44.6	2 5 26.1	2 5 7.7	2 4 49.2	2 4 30.8	3.38	1.84
57 20	2 6 37.3	2 6 18.8	2 6 0.2	2 5 41.7	2 5 23.2	2 5 4.6	3.42	1.85
57 30	2 7 12.0	2 6 53.4	2 6 34.7	2 6 16.1	2 5 57.5	2 5 38.9	+3.46	-1.86
57 40	2 7 47.0	2 7 28.3	2 7 9.6	2 6 50.9	2 6 32.2	2 6 13.5	3.50	1.87
57 50	2 8 22.5	2 8 3.7	2 7 44.9	2 7 26.1	2 7 7.3	2 6 48.5	3.54	1.88
58 0	2 8 58.3	2 8 39.4	2 8 20.6	2 8 1.7	2 7 42.8	2 7 23.9	3.58	1.89
58 10	2 9 34.6	2 9 15.6	2 8 56.6	2 8 37.7	2 8 18.7	2 7 59.7	3.62	1.90
58 20	2 10 11.2	2 9 52.2	2 9 33.1	2 9 14.0	2 8 55.0	2 8 35.9	+3.66	-1.91
58 30	2 10 48.3	2 10 29.1	2 10 10.0	2 9 50.8	2 9 31.7	2 9 12.6	3.71	1.91
58 40	2 11 25.8	2 11 6.5	2 10 47.3	2 10 28.1	2 10 8.8	2 9 49.6	3.75	1.92
58 50	2 12 3.7	2 11 44.4	2 11 25.0	2 11 5.7	2 10 46.4	2 10 27.0	3.79	1.93
59 0	2 12 42.0	2 12 22.6	2 12 3.2	2 11 43.8	2 11 24.3	2 11 4.9	3.84	1.94
59 10	2 13 20.8	2 13 1.3	2 12 41.8	2 12 22.3	2 12 2.7	2 11 43.2	+3.88	-1.95
59 20	2 14 0.0	2 13 40.4	2 13 20.8	2 13 1.2	2 12 41.6	2 12 22.0	3.92	1.96
59 30	2 14 39.7	2 14 20.0	2 14 0.3	2 13 40.6	2 13 20.9	2 13 1.2	3.97	1.97
59 40	2 15 19.9	2 15 0.1	2 14 40.3	2 14 20.5	2 14 0.6	2 13 40.8	4.02	1.98
59 50	2 16 0.5	2 15 40.6	2 15 20.7	2 15 0.8	2 14 40.9	2 14 21.0	4.06	1.99
60 0	2 16 41.6	2 16 21.6	2 16 1.6	2 15 41.6	2 15 21.6	2 15 1.6	+4.11	-2.00

## AZIMUTH OF POLARIS AT ELONGATION, 1917.

Decl. Lat.	88° 51' 40"		88° 51' 50"		88° 52' 0"		88° 52' 10"		88° 52' 20"		88° 52' 30"		Variation fr—	
	1' of Lat.		1' of Lat.		1' of Lat.		1' of Lat.		1' of Lat.		1' of Lat.		1' of Lat.	1' of Lat.
60 0	2 16	41.6	2 16	21.6	2 16	1.6	2 15	41.6	2 15	21.6	2 15	1.6	+4.11	-2.00
60 10	2 17	23.2	2 17	3.1	2 16	43.0	2 16	22.9	2 16	2.8	2 15	42.6	4.16	2.01
60 20	2 18	5.3	2 17	45.1	2 17	24.9	2 17	4.6	2 16	44.4	2 16	24.2	4.21	2.02
60 30	2 18	47.9	2 18	27.6	2 18	7.2	2 17	46.9	2 17	26.6	2 17	6.3	4.26	2.03
60 40	2 19	31.0	2 19	10.6	2 18	50.1	2 18	29.7	2 18	9.3	2 17	48.8	4.31	2.04
60 50	2 20	14.6	2 19	54.1	2 19	33.5	2 19	13.0	2 18	52.5	2 18	31.9	+4.36	-2.05
61 0	2 20	58.7	2 20	38.1	2 20	17.5	2 19	56.8	2 19	36.2	2 19	15.5	4.42	2.06
61 10	2 21	43.4	2 21	22.7	2 21	1.9	2 20	41.2	2 20	20.4	2 19	59.7	4.47	2.07
61 20	2 22	28.6	2 22	7.8	2 21	46.9	2 21	26.1	2 21	5.2	2 20	44.4	4.52	2.08
61 30	2 23	14.4	2 22	53.5	2 22	32.5	2 22	11.5	2 21	50.6	2 21	29.6	4.58	2.10
61 40	2 24	0.8	2 23	39.7	2 23	18.6	2 22	57.5	2 22	36.5	2 22	15.4	+4.64	-2.11
61 50	2 24	47.7	2 24	26.5	2 24	5.3	2 23	44.1	2 23	23.0	2 23	1.8	4.70	2.12
62 0	2 25	35.3	2 25	13.9	2 24	52.6	2 24	31.3	2 24	10.0	2 23	48.7	4.76	2.13
62 10	2 26	23.4	2 26	1.9	2 25	40.5	2 25	19.1	2 24	57.6	2 24	36.2	4.81	2.14
62 20	2 27	12.1	2 26	50.6	2 26	29.0	2 26	7.4	2 25	45.9	2 25	24.3	4.87	2.16
62 30	2 28	1.4	2 27	39.8	2 27	18.1	2 26	56.4	2 26	34.8	2 26	13.1	+4.94	-2.17
62 40	2 28	51.4	2 28	29.6	2 28	7.8	2 27	46.0	2 27	24.3	2 27	2.5	5.00	2.18
62 50	2 29	42.0	2 29	20.1	2 28	58.2	2 28	36.3	2 28	14.4	2 27	52.5	5.06	2.19
63 0	2 30	33.3	2 30	11.3	2 29	49.2	2 29	27.2	2 29	5.1	2 28	43.1	5.13	2.20
63 10	2 31	25.3	2 31	3.1	2 30	40.9	2 30	18.8	2 29	56.6	2 29	34.4	5.20	2.22
63 20	2 32	17.9	2 31	55.6	2 31	33.3	2 31	11.0	2 30	48.7	2 30	26.4	+5.26	-2.23
63 30	2 33	11.2	2 32	48.8	2 32	26.3	2 32	3.9	2 31	41.5	2 31	19.0	5.33	2.24
63 40	2 34	5.2	2 33	42.6	2 33	20.1	2 32	57.5	2 32	35.0	2 32	12.4	5.40	2.26
63 50	2 34	59.9	2 34	37.2	2 34	14.5	2 33	51.8	2 33	29.2	2 33	6.5	5.48	2.27
64 0	2 35	55.4	2 35	32.6	2 35	9.7	2 34	46.9	2 34	24.1	2 34	1.2	5.56	2.28
64 10	2 36	51.6	2 36	28.6	2 36	5.7	2 35	42.7	2 35	19.7	2 34	56.8	+5.63	-2.30
64 20	2 37	48.6	2 37	25.5	2 37	2.4	2 36	39.3	2 36	16.1	2 35	53.0	5.70	2.31
64 30	2 38	46.3	2 38	23.1	2 37	59.8	2 37	36.6	2 37	13.3	2 36	50.1	5.78	2.32
64 40	2 39	44.9	2 39	21.5	2 38	58.1	2 38	34.7	2 38	11.3	2 37	47.9	5.86	2.34
64 50	2 40	44.2	2 40	20.7	2 39	57.1	2 39	33.6	2 39	10.1	2 38	46.5	5.94	2.35
65 0	2 41	44.4	2 41	20.7	2 40	57.0	2 40	33.3	2 40	9.6	2 39	45.9	+6.02	-2.37
65 10	2 42	45.4	2 42	21.5	2 41	57.7	2 41	33.9	2 41	10.0	2 40	46.2	6.10	2.38
65 20	2 43	47.2	2 43	23.2	2 42	59.3	2 42	35.3	2 42	11.3	2 41	47.3	6.19	2.40
65 30	2 44	50.0	2 44	25.8	2 44	1.7	2 43	37.6	2 43	13.4	2 42	49.3	6.28	2.41
65 40	2 45	53.6	2 45	29.3	2 45	5.0	2 44	40.7	2 44	16.4	2 43	52.1	6.37	2.43
65 50	2 46	58.1	2 46	33.7	2 46	9.2	2 45	44.8	2 45	20.3	2 44	55.9	+6.46	-2.44
66 0	2 48	3.6	2 47	39.0	2 47	14.4	2 46	49.8	2 46	25.1	2 46	0.5	6.56	2.46
66 10	2 49	10.0	2 48	45.2	2 48	20.5	2 47	55.7	2 47	30.9	2 47	6.1	6.65	2.48
66 20	2 50	17.4	2 49	52.4	2 49	27.5	2 49	2.6	2 48	37.6	2 48	12.7	6.75	2.49
66 30	2 51	25.7	2 51	0.6	2 50	35.5	2 50	10.4	2 49	45.3	2 49	20.2	6.85	2.51
66 40	2 52	35.1	2 52	9.8	2 51	44.6	2 51	19.3	2 50	54.0	2 50	28.7	+6.95	-2.53
66 50	2 53	45.5	2 53	20.1	2 52	54.6	2 52	29.2	2 52	3.7	2 51	38.3	7.05	2.54
67 0	2 54	57.0	2 54	31.4	2 54	5.7	2 53	40.1	2 53	14.5	2 52	48.9	7.16	2.56
67 10	2 56	9.5	2 55	43.7	2 55	17.9	2 54	52.1	2 54	26.3	2 54	0.5	7.27	2.58
67 20	2 57	23.2	2 56	57.2	2 56	31.2	2 56	5.2	2 55	39.3	2 55	13.3	7.38	2.60
67 30	2 58	37.9	2 58	11.8	2 57	45.6	2 57	19.4	2 56	53.3	2 56	27.1	+7.49	-2.62
67 40	2 59	53.8	2 59	27.5	2 59	1.2	2 58	34.8	2 58	8.5	2 57	42.1	7.60	2.63
67 50	3 1	10.9	3 0	44.4	3 0	17.9	2 59	51.3	2 59	24.8	2 58	58.3	7.72	2.65
68 0	3 2	29.2	3 2	2.5	3 1	35.8	3 1	9.0	3 0	42.3	3 0	15.6	7.84	2.67
68 10	3 3	48.8	3 3	21.8	3 2	54.9	3 2	28.0	3 2	1.1	3 1	34.2	7.97	2.69
68 20	3 5	9.6	3 4	42.4	3 4	15.3	3 3	48.2	3 3	21.1	3 2	54.0	+8.10	-2.71
68 30	3 6	31.6	3 6	4.3	3 5	37.0	3 5	9.7	3 4	42.3	3 4	15.0	8.23	2.73
68 40	3 7	55.0	3 7	27.5	3 7	0.0	3 6	32.4	3 6	4.9	3 5	37.4	8.36	2.75
68 50	3 9	19.8	3 8	52.0	3 8	24.3	3 7	56.6	3 7	28.8	3 7	1.1	8.49	2.77
69 0	3 10	45.9	3 10	17.9	3 9	50.0	3 9	22.1	3 8	54.1	3 8	26.2	8.63	2.79
69 10	3 12	13.4	3 11	45.3	3 11	17.1	3 10	49.0	3 10	20.8	3 9	52.6	+8.77	-2.82
69 20	3 13	42.4	3 13	14.0	3 12	45.7	3 12	17.3	3 11	48.9	3 11	20.5	8.92	2.84
69 30	3 15	12.9	3 14	44.3	3 14	15.7	3 13	47.1	3 13	18.5	3 12	49.9	9.06	2.86
69 40	3 16	44.9	3 16	16.0	3 15	47.2	3 15	18.4	3 14	49.6	3 14	20.8	9.22	2.88
69 50	3 18	18.4	3 17	49.4	3 17	20.3	3 16	51.3	3 16	22.2	3 15	53.2	9.38	2.90
70 0	3 19	53.6	3 19	24.3	3 18	55.0	3 18	25.7	3 17	56.4	3 17	27.2	+9.54	-2.93

FOR REDUCING TO ELONGATION OBSERVATIONS MADE NEAR ELONGATION.

<div> <div> Azimuth at Elong. </div> <div> *Time. </div> </div>	1° 0'	1° 10'	1° 20'	1° 30'	1° 40'	1° 50'	2° 0'	2° 10'	<div> <div> Azimuth at Elong. </div> <div> Time.* </div> </div>
m	"	"	"	"	"	"	"	"	m
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1	0.0	0.0	0.0	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	1
2	+ 0.1	+ 0.2	+ 0.2	0.2	0.2	0.3	0.3	0.3	2
3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	3
4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	4
5	+ 0.9	+ 1.0	+ 1.1	+ 1.3	+ 1.4	+ 1.6	+ 1.7	+ 1.9	5
6	1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.7	6
7	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.7	7
8	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8	8
9	2.8	3.2	3.7	4.2	4.6	5.1	5.6	6.0	9
10	+ 3.4	+ 4.0	+ 4.6	+ 5.1	+ 5.7	+ 6.3	+ 6.9	+ 7.4	10
11	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	11
12	4.9	5.8	6.6	7.4	8.2	9.0	9.9	10.7	12
13	5.8	6.8	7.7	8.7	9.7	10.6	11.6	12.6	13
14	6.7	7.8	9.0	10.1	11.2	12.3	13.4	14.6	14
15	+ 7.7	+ 9.0	+10.3	+11.6	+12.8	+14.1	+15.4	+16.7	15
16	8.8	10.2	11.7	13.2	14.6	16.1	17.5	19.0	16
17	9.9	11.5	13.2	14.9	16.5	18.2	19.8	21.5	17
18	11.1	12.9	14.8	16.7	18.5	20.4	22.2	24.1	18
19	12.4	14.4	16.5	18.6	20.6	22.7	24.7	26.8	19
20	+13.7	+16.0	+18.3	+20.6	+22.8	+25.1	+27.4	+29.7	20
21	15.1	17.6	20.1	22.7	25.2	27.7	30.2	32.7	21
22	16.6	19.3	22.1	24.9	27.6	30.4	33.2	35.9	22
23	18.1	21.1	24.2	27.2	30.2	33.2	36.2	39.3	23
24	19.7	23.0	26.3	29.6	32.9	36.2	39.5	42.8	24
25	+21.4	+25.0	+28.5	+32.1	+35.7	+39.2	+42.8	+46.4	25

<div> <div> Azimuth at Elong. </div> <div> *Time. </div> </div>	2° 10'	2° 20'	2° 30'	2° 40'	2° 50'	3° 0'	3° 10'	3° 20'	<div> <div> Azimuth at Elong. </div> <div> Time.* </div> </div>
m	"	"	"	"	"	"	"	"	m
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	1
2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	2
3	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	3
4	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8	4
5	+ 1.9	+ 2.0	+ 2.1	+ 2.3	+ 2.4	+ 2.6	+ 2.7	+ 2.9	5
6	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	6
7	3.7	3.9	4.2	4.5	4.8	5.0	5.3	5.6	7
8	4.8	5.1	5.5	5.9	6.2	6.6	7.0	7.3	8
9	6.0	6.5	7.0	7.4	7.9	8.3	8.8	9.3	9
10	+ 7.4	+ 8.0	+ 8.6	+ 9.2	+ 9.7	+10.3	+10.9	+11.4	10
11	9.0	9.7	10.4	11.1	11.8	12.4	13.1	13.8	11
12	10.7	11.5	12.3	13.2	14.0	14.8	15.6	16.5	12
13	12.6	13.5	14.5	15.4	16.4	17.4	18.4	19.3	13
14	14.6	15.7	16.8	17.9	19.0	20.2	21.3	22.4	14
15	+16.7	+18.0	+19.3	+20.6	+21.9	+23.1	+24.4	+25.7	15
16	19.0	20.5	21.9	23.4	24.9	26.3	27.8	29.3	16
17	21.5	23.1	24.8	26.4	28.1	29.7	31.4	33.0	17
18	24.1	25.9	27.8	29.6	31.5	33.3	35.2	37.0	18
19	26.8	28.9	30.9	33.0	35.1	37.1	39.2	41.3	19
20	+29.7	+32.0	+34.3	+36.6	+38.8	+41.1	+43.4	+45.7	20
21	32.7	35.3	37.8	40.3	42.8	45.3	47.9	50.4	21
22	35.9	38.7	41.5	44.2	47.0	49.8	52.5	55.3	22
23	39.3	42.3	45.3	48.3	51.4	54.4	57.4	60.4	23
24	42.8	46.0	49.3	52.6	55.9	59.2	62.5	65.8	24
25	+46.4	+49.9	+53.5	+57.1	+60.7	+64.2	+67.8	+71.4	25

\*Sidereal time from elongation.

FOR FINDING THE TIMES OF UPPER AND LOWER CULMINATION OF POLARIS, 1917, FROM THE OBSERVED TIMES WHEN THE STAR IS ON THE SAME VERTICAL CIRCLE WITH THE STARS  $\zeta$  URSÆ MAJORIS (MIZAR) *SUB POLO* AND  $\delta$  CASSIOPEIÆ *SUB POLO*, RESPECTIVELY.

Except at high latitudes, the pole star at either upper or lower culmination furnishes a simple and convenient method for laying down a meridian line on the earth's surface at points in the northern hemisphere. When the local time is unknown and accurate astronomical instruments are not available, the time of culmination of Polaris may be found by observing the instant when Polaris is vertically above (has the same azimuth as)  $\zeta$  Ursæ Majoris (Mizar) below the pole, or  $\delta$  Cassiopeiæ below the pole. In the former case, for the year 1917, Polaris is approaching upper culmination and in the latter case it is approaching lower culmination. The mean time interval which elapses between either of the observed times above mentioned and upper or lower culmination, as the case may be, is given for  $\zeta$  Ursæ Majoris and  $\delta$  Cassiopeiæ at ten-day intervals in the following table. This method can not be used at places south of 30° north latitude.

ζ URSÆ MAJORIS (MIZAR). (Upper culmination of Polaris.)						δ CASSIOPEIÆ. (Lower culmination of Polaris.)							
Date.	Lat.	40°	45°	50°	55°	60°	Date.	Lat.	35°	40°	45°	50°	55°
		m s	m s	m s	m s	m s			m s	m s	m s	m s	m s
Jan.	1	9 26	9 24	9 22	9 19	9 16	Jan.	1	10 33	10 35	10 36	10 39	10 42
	11	9 16	9 14	9 12	9 9	9 6		11	10 22	10 24	10 26	10 28	10 31
	21	9 5	9 3	9 1	8 59	8 55		21	10 12	10 14	10 15	10 18	10 20
	31	8 54	8 53	8 51	8 48	8 45		31	10 1	10 3	10 4	10 7	10 10
Feb.	10	8 44	8 43	8 41	8 38	8 35	Feb.	10	9 51	9 52	9 54	9 57	9 59
	20	8 35	8 34	8 32	8 29	8 26		20	9 42	9 43	9 45	9 47	9 50
Mar.	2	8 28	8 26	8 24	8 22	8 18	Mar.	2	9 34	9 35	9 37	9 39	9 42
								12	9 28	9 29	9 31	9 33	9 36
June	30	9 11	9 10	9 8	9 5	9 2		22	9 23	9 25	9 27	9 29	9 31
July	10	9 23	9 21	9 19	9 16	9 12	Apr.	1	9 21	9 22	9 24	9 26	9 29
	20	9 34	9 32	9 30	9 27	9 23		11	9 20	9 22	9 23	9 26	9 28
	30	9 44	9 43	9 40	9 38	9 34		21	9 22	9 24	9 25	9 28	9 30
Aug.	9	9 55	9 53	9 51	9 48	9 44	May	1	9 26	9 28	9 29	9 31	9 34
	19	10 5	10 3	10 1	9 58	9 54		11	9 32	9 33	9 34	9 37	9 40
	29	10 14	10 12	10 9	10 7	10 3		21	9 39	9 40	9 42	9 44	9 47
Sept.	8	10 22	10 20	10 17	10 14	10 10		31	9 47	9 49	9 50	9 53	9 56
	18	10 28	10 26	10 24	10 21	10 17	June	10	9 57	9 59	10 0	10 3	10 6
	28	10 33	10 31	10 29	10 26	10 22		20	10 8	10 9	10 11	10 13	10 16
Oct.	8	10 37	10 35	10 33	10 29	10 26		30	10 19	10 20	10 22	10 24	10 27
	18	10 39	10 37	10 35	10 31	10 28	July	10	10 30	10 32	10 33	10 36	10 39
	28	10 39	10 38	10 35	10 32	10 28		20	10 41	10 43	10 44	10 47	10 50
Nov.	7	10 38	10 36	10 34	10 31	10 27	July	30	10 52	10 54	10 56	10 59	11 2
	17	10 35	10 33	10 31	10 28	10 24							
	27	10 30	10 28	10 26	10 23	10 19	Nov.	27	11 39	11 41	11 43	11 46	11 49
Dec.	7	10 24	10 22	10 19	10 16	10 13	Dec.	7	11 32	11 34	11 36	11 39	11 42
	17	10 16	10 14	10 12	10 8	10 5		17	11 24	11 26	11 28	11 31	11 34
	27	10 7	10 5	10 3	10 0	9 56		27	11 15	11 17	11 18	11 21	11 24
	31	10 3	10 1	9 59	9 56	9 52		31	11 11	11 13	11 14	11 17	11 20

APPARENT PLACE, TIME OF UPPER CULMINATION, AND TIME INTERVAL  
BETWEEN UPPER CULMINATION AND ELONGATION EAST OR WEST, OF  
POLARIS, 1917.

The local mean time of culmination on any meridian for a given date is found by taking from the following table the *Mean Time* of the nearest Greenwich culmination, and applying to it the product of the *Var. per Day* by the integral number of intervening days, this product being numerically additive for an earlier date and subtractive for a later date than that given in the table; and by applying also the product of the *Var. per Hour* by the longitude from Greenwich expressed in hours and fractions of an hour, this product being numerically additive for East longitudes and subtractive for West longitudes.

The time interval between upper and lower culmination is 12<sup>h</sup> diminished by one-half the numerical value of the *Var. per Day*.

The last column below applies to all meridians.

Date.	Upper Culmination, Meridian of Greenwich.					Latitude.	Mean Time Interval, Elongation minus Upper Culm.
	Apparent Right Ascension.	Apparent Declination.	Mean Time.	Var. per Day.	Var. per Hour.		
	h m l 29 s	° ' " +88 51 "	h m s	m s	W. E. s	°	W. E. h m
Jan. 1	89	70.6	6 47 7	-3 56.9	-9.87+	10	+5 58.2-
11	79	71.6	6 7 37	3 57.0	9.88	12	5 58.1
21	68	71.9	5 28 8	3 57.0	9.88	14	5 57.9
31	58	71.5	4 48 38	3 56.9	9.87	16	5 57.7
Feb. 10	48	70.5	4 9 9	3 56.9	9.87	18	5 57.6
20	39	69.0	3 29 41	-3 56.8	-9.87+	20	+5 57.4-
Mar. 2	31	66.9	2 50 14	3 56.6	9.86	22	5 57.2
12	25	64.3	2 10 49	3 56.5	9.85	24	5 57.0
22	20	61.5	1 31 25	3 56.3	9.84	26	5 56.8
Apr. 1	18	58.5	0 52 4	3 56.0	9.83	28	5 56.6
11	17	55.3	0 12 44	-3 55.8	-9.82+	30	+5 56.4-
20	19	52.2	23 33 27	3 55.6	9.82	32	5 56.2
30	23	49.3	22 54 11	3 55.4	9.81	34	5 56.0
May 10	28	46.7	22 14 58	3 55.3	9.80	36	5 55.7
20	35	44.4	21 35 46	3 55.1	9.80	38	5 55.5
30	44	42.5	20 56 35	-3 55.0	-9.79+	40	+5 55.2-
June 9	54	41.1	20 17 28	3 54.9	9.79	42	5 54.9
19	64	40.2	19 38 17	3 54.8	9.78	44	5 54.7
29	75	39.8	18 59 9	3 54.8	9.78	46	5 54.3
July 9	87	40.0	18 20 1	3 54.8	9.78	48	5 54.0
19	98	40.7	17 40 54	-3 54.8	-9.78+	50	+5 53.6-
29	109	42.0	17 1 46	3 54.8	9.78	52	5 53.2
Aug. 8	120	43.7	16 22 37	3 54.9	9.79	54	5 52.8
18	130	45.9	15 43 28	3 54.9	9.79	56	5 52.3
28	139	48.6	15 4 18	3 55.0	9.79	58	5 51.8
Sept. 7	147	51.6	14 25 7	-3 55.2	-9.80+	60	+5 51.2-
17	154	54.8	13 45 55	3 55.3	9.80	62	5 50.5
27	160	58.4	13 6 41	3 55.4	9.81	64	5 49.8
Oct. 7	164	62.0	12 27 26	3 55.6	9.82	66	5 48.9
17	166	65.8	11 48 9	3 55.8	9.82	68	5 47.8
27	167	69.6	11 8 51	-3 55.9	-9.83+	70	+5 46.6-
Nov. 6	165	73.3	10 29 31	3 56.1	9.84		
16	162	76.8	9 50 9	3 56.3	9.85		
26	158	80.1	9 10 45	3 56.4	9.85		
Dec. 6	152	83.0	8 31 20	3 56.6	9.86		
16	144	85.5	7 51 53	-3 56.8	-9.87+		
26	135	87.5	7 12 25	-3 56.9	-9.87+		





## ON THE ARRANGEMENT AND USE OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.

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There are in general use three different kinds of time, True Solar Time—also called Apparent Solar Time—Mean Solar Time, and Sidereal Time.

*True or Apparent Solar Time* is measured by the diurnal motion of the Sun, the length of the day being the interval between two successive transits of the Sun over the same meridian, and the time of day being the hour-angle of the Sun westward from the meridian. Owing to the obliquity of the ecliptic and to the lack of uniformity of the motion of the Earth in its orbit, the rate of motion of the Sun in hour-angle and the length of the apparent solar day are not constant. Therefore clocks and chronometers can not be regulated to apparent solar time, which may, however, be determined by observations of the Sun when visible.

*Mean Solar Time* is measured by the motion of a fictitious body called the mean Sun, which is supposed to move uniformly in the celestial equator, completing the circuit in one tropical year. Since mean solar time is uniform and regular in its passage, clocks and watches may be regulated to it, and those in ordinary use are usually so regulated.

Mean solar time can not, of course, be determined by direct observation, but may be determined indirectly by correcting observations of the Sun for the equation of time, or by converting to mean time sidereal time determined by observations of fixed stars.

*The Equation of Time* is the difference in hour-angle between the true Sun and the mean Sun. The true Sun is sometimes before and sometimes behind the mean Sun by an amount which varies from zero to about 16 minutes. The equation of time is given for Greenwich mean noon on pages 2-16 and for Washington apparent noon on pages 514-521.

*The Mean Solar Day* is the unit of mean solar time and is equal in length to the mean or average of all the true or apparent solar days of the year. It may be otherwise defined as the interval of time elapsing between two successive transits of the mean Sun across the meridian of any place.

*Sidereal Time* or star time, in general terms, is measured by the diurnal motion of the fixed stars, or, speaking more precisely, by the diurnal motion of that point on the celestial equator called the vernal equinox, from which the right ascensions of the heavenly bodies are measured. Astronomical clocks regulated to sidereal time are called sidereal clocks. Sidereal time may be determined from observations of stars whose right ascensions are known.

*A Sidereal Day* is very nearly the length of time in which the Earth rotates on its axis and is accurately defined as the time interval between two suc-

cessive transits of the vernal equinox over the same meridian. The sidereal day is shorter than the mean solar day by  $3^m 56^s.555$  sidereal time or  $3^m 55^s.909$  mean solar time, the tropical year of 365.2422 mean solar days containing 366.2422 sidereal days. Sidereal time and the length of the sidereal day are subject to slight irregularities on account of small differences between the positions of the true and mean equinoxes.

The mean solar and sidereal days are each divided into 24 hours. About March 23 (civil date) of each year, about two days after the vernal equinox, there is an instant when the face of a sidereal clock shows the same time as a mean time clock, and the former gains on the latter  $3^m 56^s.555$  sidereal time per mean solar day, so that at the end of a year it will have gained one sidereal day and will again agree with the mean time clock.

*The Civil Day* begins at midnight and comprises 24 hours, the hours being counted from 0 to 12 in two series; the first, marked A. M., running from midnight to noon, and the second, marked P. M., running from noon to midnight.

*The Astronomical Day* begins at noon on the civil day of the same date, the 24 hours being counted from 0 to 24, running from noon of one day to noon of the next following day. Astronomical time as well as civil time may be either apparent or mean.

The civil day begins twelve hours before the astronomical day; therefore the first half of the civil day coincides with the last half of the preceding astronomical day, and the last half of the civil day coincides with the first half of the astronomical day of the same date. Hence we have the following rules:

*To convert Civil Time into Astronomical Time.*—If the civil time is marked A. M., take one from the day and add twelve to the hours; if the civil time is marked P. M., take away the designation P. M. Thus, January 9, 2 o'clock, A. M., civil time, is January 8,  $14^h$ , astronomical time; and January 9, 2 o'clock, P. M., civil time, is January 9,  $2^h$ , astronomical time.

*To convert Astronomical Time into Civil Time.*—If the astronomical time is less than twelve hours, write P. M. after it; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

*To convert Solar or Sidereal Time of any meridian B to that of another meridian A*, add the difference of longitude expressed in time when A is east of B, and subtract the difference of longitude when A is west of B.

Greenwich mean time, which at any fixed observatory is obtained by applying the longitude to the local mean time, on board ship is usually taken from the mean time chronometer set to Greenwich time.

Greenwich mean noon of any date means the noon at the beginning of the astronomical day.

## PART I.—THE EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

Pages 2–17 contain for Greenwich mean noon of each day the *Sun's Apparent Right Ascension, Apparent Declination, Semidiameter, Horizontal Parallax, True Longitude, and Latitude*. They also contain the *Logarithm of the Radius Vector of the Earth, the Precession in Longitude, the Nutation in Longitude, the Aberration, the True Obliquity, the Equation of Time, the Sidereal Time or Right Ascension of Mean Sun, and the Mean Time of Sidereal Noon*. Adjoining columns contain, for each Greenwich mean noon, the *Variation per*

*Hour* for those of the quantities for which it seemed advisable to give a rate of motion. By multiplying any one of those variations by the hours and parts of an hour from Greenwich mean noon and adding the product algebraically to the corresponding quantity at noon, we obtain an approximate value of the quantity in question for any given Greenwich mean time. If great exactness is desired, the value of the hourly variation is found for the time halfway between Greenwich mean noon and the given Greenwich mean time before multiplying by the hours and parts of an hour from Greenwich mean noon.

It is to be noted that here, as elsewhere throughout the volume, the positive sign used with declinations or latitudes indicates north and the negative sign south.

The Sun's *Apparent Right Ascension* and *Declination* are affected both by aberration and by nutation, and therefore denote the *apparent* position of the *true* Sun. The Sun's *True Longitude* is the true geometric longitude not corrected for aberration; it is referred to the true equinox.

The Sun's *Latitude* is referred to the ecliptic of the date.

The Sun's *Declination* is required whenever that body is observed for the purpose of finding latitude, local time, or azimuth.

The Sun's *Semidiameter* is used in reducing the altitude of the upper or lower limb of the Sun to the altitude of the center; and in reducing the angular distance between the limb of the Sun and any other object to the distance from the center of the Sun.

The *Horizontal Parallax* is the angle subtended by the equatorial radius of the Earth, as seen from the center of the Sun.

The *Precession in Longitude* is the quantity to be applied to the longitude of the Sun referred to the mean equinox of the beginning of the Besselian fictitious year, i. e., the instant when the Sun's mean longitude is  $280^\circ$ , in order to refer it to the mean equinox of date.

The *Nutation in Longitude* is the quantity to be applied to the longitude of a body referred to the mean equinox of date in order to refer it to the true equinox, short-period terms being neglected.

The *Aberration* is the quantity to be subtracted from the true longitude of the Sun in order to obtain its apparent longitude.

The *True Obliquity* is the inclination of the Earth's equator to the ecliptic, short-period terms being neglected.

The corrections to the values of the nutation and the obliquity here given, to take account of the short-period terms, may be found on pages 215–216.

The *Equation of Time* is the apparent time of Greenwich mean noon, or the hour angle of the true Sun at that instant. When interpolated to any given Greenwich mean time, it is the correction to be applied to mean time in order to obtain apparent time.

The *Sidereal Time of Mean Noon* is the right ascension of the mean Sun at Greenwich mean noon. It may be reduced for the longitude or to any Greenwich mean time by using the hourly variation,  $+9^s.8565$ ; or by Table III, page 693 of this volume, for reducing intervals of mean time to sidereal time. It is useful in converting mean time to sidereal time. We first find the Greenwich mean time, then the right ascension of the mean Sun for that time.

and this being added to the local astronomical mean time, i. e., the hour angle of the mean Sun, will give the hour angle of the vernal equinox, or the sidereal time required.

The sidereal time of mean noon, reduced for the longitude of the place, is also used in converting sidereal time to mean time. Subtracting the reduced value from the given sidereal time gives the interval of sidereal time past noon, and that is converted into the required mean time by subtracting from it the corresponding reduction of a sidereal interval to a mean-time interval, taken from Table II, page 690 of this volume. If the sidereal interval is less than  $3^m 56^s.555$ , there are two mean times corresponding to the given sidereal time, one a few minutes after the preceding noon, and the other a few minutes before the following noon, the mean time interval between these two mean times being  $23^h 56^m 4^s.09$ . The mean time, approximately known, will always show which one is to be taken. Instead of using Table II, the reduction of a sidereal to a mean time interval may be found by multiplying  $-9^s.8296$  by the hours and parts of an hour of the sidereal interval.

The *Mean Time of Sidereal Noon* is the number of hours, minutes, and seconds after Greenwich mean noon when the vernal equinox passes the meridian of Greenwich; it may be reduced to any other meridian by using the hourly variation,  $-9^s.8296$ , to effect the necessary interpolation, or the reduction may be taken directly from Table II. In the same way the reduction may be made to any Greenwich sidereal time, and the result will then represent  $24^h -$  Right Ascension of the Mean Sun. This column may be conveniently used for converting sidereal to mean time, or—which is the same problem—for finding the time of meridian passage of a star whose right ascension is known, by adding to the mean time of the *preceding* local sidereal noon, the mean time equivalent of the given sidereal time.

As examples of the use of pages 2-17:

1. Let the Sun's declination be required for 1917, April 14,  $2^h 5^m 20^s$ , P. M., at a place whose longitude is  $58^\circ 20'$ , or  $3^h 53^m 20^s$  west from Greenwich:

Local mean time . . . . .	April 14,	$2^h 5^m 20^s$
Longitude from Greenwich (additive) . . . . .		$3^h 53^m 20^s$
Greenwich mean time . . . . .	April 14,	$5^h 58^m 40^s$

Reducing the minutes and seconds to decimals of an hour, we find that this moment is  $5^h.978$  after Greenwich mean noon on April 14, or  $18^h.022$  before Greenwich mean noon on April 15.

On page 6 of the Ephemeris we find that the variation of declination per hour is:

At Greenwich mean noon, April 14 . . . . .	$+54.12$
At Greenwich mean noon, April 15 . . . . .	$+53.73$
Difference for one day . . . . .	$- 0.39$

If great exactness is desired, we find the amount of this hourly variation for the time halfway between Greenwich noon and the time of observation; that is, for 3 hours after Greenwich noon of the 14th, this being half of 6 hours. Three hours is 0.125 of a day; so the calculation is as follows:

Variation at Greenwich mean noon, April 14	+54.12
Change in 0.125 of a day.	-0''.39×0.125
Variation at 3 hours after noon	+54.07
Declination at Greenwich noon, April 14	+9 18 2.1
Change in 5.978 hours	+54''.07×5.978
Sun's declination at time of observation	+9 23 25.3

With equal facility the computation might have been made backward from the succeeding noon. Thus in the example just given the time is 18<sup>h</sup>.022 before Greenwich noon of April 15; half this interval is about 0.375 of a day, and the hourly motion for the middle of the interval is +53''.88. Then we find:

Declination at Greenwich noon, April 15	+9 39 36.3
Change in -18.022 hours,	+53''.88×-18.022
Sun's declination at time of observation	+9 23 25.3

It will always be well to make the calculation in both ways, as a check; but if the results differ slightly the one derived from the nearest noon should be regarded as the more accurate.

2. Let the Sun's right ascension and the equation of time be required for 1917, July 13, 10<sup>h</sup> 3<sup>m</sup> 30<sup>s</sup>, A. M., mean time, at a place whose longitude is 85° 15', or 5<sup>h</sup> 41<sup>m</sup> west from Greenwich.

Local astronomical mean time	July 12,	22 3 30
Longitude from Greenwich (additive)		5 41 0
Greenwich mean time	July 13,	3 44 30=3.7417
<i>Sun's Right Ascension.</i>		
Greenwich noon, July 13	h m s	7 28 38.63
Change in 3.7417 hours	10°.162×3.7417	+ 38.02
		7 29 16.65
<i>Equation of Time.</i>		
	m s	-5 27.74
	-0°.305×3.7417	- 1.14
		-5 28.88

In this case the hourly variations interpolated to half the interval, or 1<sup>h</sup>.87 after noon, have been used.

3. If the sidereal time is required for the same time and place, we have:

Sidereal time at Greenwich mean noon, July 13	h m s	7 23 10.89
Reduction for 3 <sup>h</sup> 44 <sup>m</sup> 30 <sup>s</sup> from Table III, or 9°.8565×3.7417		+ 36.88
Add the local astronomical mean time		22 3 30.00
The required sidereal time (rejecting 24 <sup>h</sup> )		5 27 17.77

4. On 1917, July 13, A. M., at a place whose longitude is 85° 15' W., suppose the sidereal time to be 5<sup>h</sup> 27<sup>m</sup> 17<sup>s</sup>.77 and that the corresponding mean time is required.

The astronomical day is July 12; the longitude in time,  $+5^h 41^m 0^s$ , or  $+5^h.6833$ .

*First solution.*

Sidereal time at Greenwich mean noon, July 12 . . . . .	$7^h 19^m 14.34^s$
Reduction for $5^h 41^m 0^s$ from Table III, or $9^s.8565 \times 5.6833$ . . . . .	$+56.02$
The sidereal time at local mean noon, July 12 . . . . .	$7 20 10.36$
The given sidereal time ( $+24^h$ , if necessary for the following subtraction) . . . . .	$29 27 17.77$
Subtracting the first from the second gives the sidereal interval from noon . . . . .	$22 7 7.41 = 22^h.1187$
Reduction for $22^h 7^m 7.41$ from Table II, or $-9^s.8296 \times 22.1187$ . . . . .	$-3 37.42$
The required astronomical mean time . . . . . July 12,	$22 3 29.99$

*Second solution.*

Mean time at Greenwich sidereal noon . . . . . July 12,	$16^h 38^m 1.71^s$
Reduction for longitude from Table II, or $-9^s.8296 \times 5.6833$ . . . . .	$-55.86$
Mean time of <i>preceding</i> local sidereal noon . . . . . July 12,	$16 37 5.85$
Add the given sidereal time . . . . .	$5 27 17.77$
Reduction for $5^h 27^m 17.77$ from Table II, or $-9^s.8296 \times 5.4549$ . . . . .	$-53.62$
The required astronomical mean time . . . . . July 12,	$22 3 30.00$

If there is any doubt about the mean time of the *preceding* local sidereal noon, the first solution is to be preferred.

Pages 18–25 contain the rectangular coordinates of the Sun, referred to the center of the Earth as the origin, and to the true equator and equinox as the plane and point of reference. Each coordinate is given for every Greenwich mean noon and midnight. The columns *Reduc. to Mean Eq'x of 1917.0* give the corrections to be applied to the coordinates for noon in order to obtain the corresponding coordinates referred to the mean equator and equinox of the beginning of the Besselian fictitious year.

Pages 26–117 contain *The Moon's Right Ascension and Declination* for each day and hour of Greenwich mean time, referred to the true equator and equinox. They are accompanied by columns of *Variations per Minute*, by means of which, interpolation may be conveniently made to any moment of Greenwich mean time. The right ascension or declination is taken out for the given day and hour of Greenwich mean time; the *Var. per Min.* is multiplied by the minutes and parts of a minute of the Greenwich time, and the product is added numerically in case of the right ascension and algebraically in case of the declination.

Thus, suppose the Moon's right ascension and declination are required for 1917, January 25,  $10^h 10^m 30^s$ , astronomical mean time at Greenwich:

	<i>Right Ascension.</i>	<i>Declination.</i>
	$h \quad m \quad s$	$^{\circ} \quad ' \quad ''$
January 25, $10^h$ . . . . .	$22 47 20.84$	$-3 11 30.1$
Change in 10.5 minutes . . . . . $2^s.2307 \times 10.5$	$23.42$	$+ 2 47.4$
January 25, $10^h 10^m 30^s$ . . . . .	$22 47 44.26$	$-3 8 42.7$

For the sake of precision the differences here employed have been interpolated for  $5^m.2 = 0^h.09$ .

Page 117 contains also the *Phases of the Moon* and the dates of the *Moon's Apogee and Perigee*, or greatest and least distances from the Earth.

Pages 118–133 contain for every Greenwich mean noon and midnight the *Moon's Longitude* and *Latitude* referred to the true equinox and the ecliptic, its *Semidiameter*, and its *Equatorial Horizontal Parallax*. The column adjoining that of the horizontal parallax gives the variation of that quantity per hour, by means of which it can be reduced to any other Greenwich mean time in the manner shown in the preceding examples. When allowing for change in the variation itself, note must be taken of the fact that the tabular interval is here 12 hours instead of 24. The quantity thus obtained is the equatorial horizontal parallax; to obtain the horizontal parallax at any given place, the correction for the latitude of the place must be applied. The reduction of the Moon's semidiameter may be readily found by multiplying the reduction of the horizontal parallax by 0.2725 (see page xiii), or by simply computing the proportional part.

If, for example, the semidiameter of the Moon is to be taken out for 1917, March 10, 7<sup>h</sup>, P. M., Greenwich mean time, we see that the difference of the semidiameters at noon and midnight of March 10 is 3''.3; then,

$$12^h : 7^h = 3''.3 : 1''.9$$

which is the correction to be added to the semidiameter at noon, because the semidiameter is increasing. The Moon's semidiameter for March 10, 7<sup>h</sup>, is therefore 15' 4''.2.

The Moon's semidiameter and horizontal parallax are required for all observations of the Moon.

Pages 118–133 contain also: The *Moon's Age*, or the time elapsed since the preceding new Moon, given to tenths of a day; the mean time of the *Moon's Transit, Upper and Lower*, at Greenwich, given to tenths of a minute; and the *Variation per Hour* of the latter quantity, that is, the variation for one hour of longitude, by means of which the local time of an upper or lower transit of the Moon may be computed for any place whose longitude is known.

Pages 134–198 contain for each of the seven major planets the geocentric ephemeris followed immediately by the heliocentric ephemeris.

The geocentric ephemeris gives the planet's *Apparent Right Ascension* and *Apparent Declination* with the respective *Variations per Hour* or *per Day*. The positions thus given are referred to the true equator and equinox, and are corrected for aberration. The geocentric ephemeris gives also the *Logarithm of Distance from Earth* with the *Variation per Hour* or *per Day*, the planet's *Semidiameter* and *Horizontal Parallax*, and, to tenths of a minute, the time of *Transit Meridian of Greenwich*. All the data, except the last named, are given for Greenwich mean noon.

The right ascension and declination of a planet are required whenever it is observed for time, latitude, or azimuth. The mode of reducing the ephemeris positions of planets to other instants of Greenwich mean time is the same as that already given for the Sun. The local mean time of meridian transit of any planet at any place can be found by dividing the proper daily difference of the ephemeris times by 24, multiplying the quotient by the longitude of the place expressed in hours and fractions, and applying the product with its proper sign to the time of Greenwich transit.

The heliocentric ephemeris gives the *Heliocentric Longitude*, *Mean Equinox of Date*; the *Heliocentric Latitude*; and the *Logarithm of Radius Vector*; with



their respective *Variations per Day*. The heliocentric longitude may be referred to the true equinox by applying nutation. The variations are given for the instant of Greenwich mean noon. The column *Reduction to Orbit* contains the correction to be applied to the heliocentric longitude in order to obtain the longitude measured along the orbit of the planet. This orbit longitude is equal to the distance from the mean equinox to the node, plus the distance from the node to the planet. The heliocentric latitude is referred to the ecliptic of the date. The *Logarithm of Radius Vector* is the logarithm of the distance of the center of the planet from that of the Sun.

## PART II.—THE EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

Pages 200–201 contain formulæ for reducing mean positions of stars to apparent positions, including expressions for the Besselian star-numbers and star-constants, and for the independent star-numbers; the whole based upon the constants of the Paris Conference of May, 1896, and expressed in the notation of BESSEL.

Pages 202–205 contain the logarithms of the *Besselian Star-Numbers*,  $A$ ,  $B$ ,  $C$ ,  $D$ , for each Washington mean midnight, with the values of  $E$  appended at the bottoms of the pages. The terms of short period have been included. These numbers serve to reduce the mean place of a star at the beginning of the Besselian fictitious year to its apparent place at any of the dates for which the numbers are given, and in ordinary cases four-figure logarithms suffice; but where extreme accuracy is desired the logarithms of  $A$ ,  $C$ , and  $D$  are sometimes needed to five places of decimals. Along with the solar day, the first column contains the sidereal hour of Washington mean midnight for certain dates, and by interpolation among them it is easy to find the sidereal time for which any set of quantities is given.

The following is an example of the reduction of a star to apparent place by the Besselian star-numbers:

*Computation of the apparent place of  $\epsilon$  Aquilæ, July 2, 1917, for the upper transit at Washington.*

$\log a$	0.5165	$\log b$	7.2446 $n$	$\log c$	8.0440	$\log d$	8.8235 $n$
$\log A$	9.9260	$\log B$	0.0766 $n$	$\log C$	0.5420	$\log D$	1.3035 $n$
$\log a'$	0.5166	$\log b'$	9.9941	$\log c'$	9.4341	$\log d'$	8.4152 $n$
$\log Aa$	0.4425	$\log Bb$	7.3212	$\log Cc$	8.5860	$\log Dd$	0.1270
$\log Aa'$	0.4426	$\log Bb'$	0.0707 $n$	$\log Cc'$	9.9761	$\log Dd'$	9.7187
<i>Mean Place, 1917.0</i>				$\alpha_0 =$	$18^{\text{h}} 37^{\text{m}} 43.817^{\text{s}}$	$\delta_0 =$	$-9^{\circ} 7' 58.66''$
				$Aa =$	+2.770	$Aa' =$	+2.77
				$Bb =$	+0.002	$Bb' =$	-1.18
				$Cc =$	+0.039	$Cc' =$	+0.95
				$Dd =$	+1.340	$Dd' =$	+0.52
				$E =$	+0.003	$\tau\mu' =$	0.00
				$\tau\mu =$	+0.001		
<i>Apparent Place, July 2,</i>				$\alpha =$	$18^{\text{h}} 37^{\text{m}} 47.972^{\text{s}}$	$\delta =$	$-9^{\circ} 7' 55.60''$

Pages 206–213 contain the *Independent Star-Numbers*, which can frequently be advantageously used instead of the *Besselian Star-Numbers*. The terms of short period have been included. These quantities are connected with those of Bessel by the relations given on page 200, which also contains the formulæ and precepts for the application of both systems of numbers. In order to use

the Besselian numbers, it is necessary to have the values of the star-constants,  $a, b, c, d, a', b', c', d'$ , while the independent star-numbers render it possible to determine the apparent place of a star without computing these star-constants. Four-figure logarithms usually suffice, but where extreme accuracy is desired the logarithms of  $g$  and  $h$  are needed to five places of decimals, and  $G$  and  $H$  are needed to one-tenth of a minute of arc. The column  $\tau$  gives the fraction of a year, counted from the beginning of the Besselian fictitious year to each date.

The following is an example of the reduction of a star to apparent place by the independent star-numbers:

*Computation of the apparent place of  $\alpha$  Aquilæ, July 2, 1917, for the upper transit at Washington.*

	<sup>h</sup> $G=23$	<sup>m</sup> 43.9							
	$\alpha_0=18$	37.7		$\delta_0=-$	9	8.0			
	$H=11$	20.7		$G+\alpha_0=$	18 <sup>h</sup>	21 <sup>m</sup> .6			
				$H+\alpha_0=$	5	58.4			
$\log \frac{1}{r}$	8.8239		$\log \frac{1}{r}$	8.8239			$\alpha_0=$	<sup>h</sup> 18 <sup>m</sup> 37 <sup>s</sup> 43.817	
$\log g$	1.2291		$\log h$	1.3099			$f+f'=$	+2.594	
$\sin (G+\alpha_0)$	9.9981 <i>n</i>		$\sin (H+\alpha_0)$	0.0000			$(g)=$	+0.181	
$\tan \delta_0$	9.2062 <i>n</i>		$\sec \delta_0$	0.0055			$(h)=$	+1.378	
							$\tau\mu=$	+0.001	
$\log (g)$	9.2573		$\log (h)$	0.1393			$\alpha=$	18 37 47.971	
$\log g$	1.2291		$\log h$	1.3099			$\delta_0=-$	9 7 58.66	
$\cos (G+\alpha_0)$	8.9736		$\cos (H+\alpha_0)$	7.8439			$(g')=$	+1.59	
			$\sin \delta_0$	9.2007 <i>n</i>			$(h')=$	-0.02	
$\log (g')$	0.2027						$(i)=$	+1.49	
			$\log (h')$	8.3545 <i>n</i>			$\tau\mu'=$	0.00	
							$\delta=-$	9 7 55.60	
$\log i$	0.1793								
$\cos \delta_0$	9.9945								
$\log (i)$	0.1738								

Page 214 contains for every tenth sidereal day the *Besselian and Independent Star-Numbers*, exclusive of all short-period terms. They are useful in computing ephemerides of stars, similar to those on pages 316-513, for which data containing short-period terms should not be employed.

Pages 215-216 contain for Washington mean midnight of each day the short-period terms of the nutation in longitude and obliquity, for use in connection with the formulæ on page 201, and the coefficients mentioned later, which are given for each star on pages 316-513.

Pages 217-230 contain the *Mean Places of Ten-day Stars* for the beginning of the Besselian fictitious year. These pages give also the magnitude, spectral type, annual variations, and proper motions for each star. The annual variations are to be considered as the differential coefficients of each coordinate with respect to the time at the beginning of the year.

Page 231 contains, for the *Circumpolar Stars*, the same data as the immediately preceding pages do for the ten-day stars.

Pages 232-315 contain for every upper transit at Washington the apparent positions of seventeen northern and eighteen southern circumpolar stars arranged in the order of their right ascensions. The mean solar time of transit is given in the column *Washington Mean Time*, in order that each transit above

and below the pole may be readily identified. Suppose, for example, that the transit of Polaris below the pole on January 26 is to be found, and we wish to know whether it precedes or follows the upper transit of the same date. On page 232 we find that the upper transit occurs January 26.2; the lower transit, therefore, occurs January 26.7. But the lower transit of July 1 precedes the upper one, which occurs July 1.8. A transit occurring very nearly at noon may also be identified without a computation to ascertain the actual mean date, by simply noting the tenth of a day in the column *Washington Mean Time*.

The secant and tangent of the apparent declination for the 15th of each month and the mean place in right ascension and declination for the beginning of the year are given for each star at the foot of the page.

Pages 316–513 contain, for every tenth upper transit at Washington, the apparent places of 790 stars, being all those given in the list of mean places of ten-day stars. The *Washington Mean Time* in the left-hand column of each page gives the day and tenth of the transit, so that intermediate transits may be readily identified; and to facilitate interpolation, the differences of each coordinate are given for every ten days.

In connection with the ephemeris of each ten-day star there are given at the foot of the page, (1) the seconds of the mean place in both right ascension and declination for the beginning of the year, (2) the secant and the tangent of the mean of the star's greatest and least apparent declinations during the year, and (3) the coefficients of the short-period terms of the nutation, the use of which is explained on page 201.

Pages 514–521 contain, for Washington apparent noon, the *Apparent Right Ascension and Declination* of the Sun, the *Equation of Time*, and the *Variation per Hour* of these quantities; the *Semidiameter* of the Sun, and the *Sidereal Time of Semidiameter Passing Meridian*. The last column on each page contains the *Sidereal Time of Mean Noon*.

The *Equation of Time, Mean-App.* is the correction to be applied to apparent time in order to obtain mean time. Each number as given is the mean time of transit of the Sun's center over the meridian of Washington counted from the nearest noon.

Pages 522–537 contain the *Right Ascension of Center*, the *Geocentric Declination of Center*, the *Sidereal Time of Semidiameter Passing Meridian*, the *Geocentric Semidiameter*, and the *Equatorial Horizontal Parallax* of the Moon, and the *Washington Mean Time* at the moment of each upper and lower transit over the meridian of Washington.

The *Variation per Hour of Longitude* is the correction to be applied in each case to the quantity in the preceding column to obtain its value for the time of transit over the meridian one hour west of Washington, supposing the rate of change to be uniform and equal to what it is at the instant of transit over the meridian of Washington. The quantities in the third column, when corrected for another longitude by the hourly variations, give the local mean time of transit for that longitude. By means of the variations per hour of longitude any one of the quantities under consideration can be computed with great exactness for the moment of transit over any meridian not more than one hour distant from Washington. To obtain the same accuracy for more distant

meridians, we may proceed as follows: Let  $F$  represent either the *Washington Mean Time*, the *Right Ascension of Center*, or the *Geocentric Declination of Center*, and let  $V$  represent the corresponding *Variation per Hour of Longitude*. Write down three successive values of  $F$ , together with the corresponding values of  $V$ , and difference the latter as in the following scheme, where the middle values,  $F_0$  and  $V_0$ , belong to the culmination from which is to be derived the value of  $F$  for the culmination on the meridian whose longitude is  $\lambda$ :—

Function.	Var. per Hour of Longitude.	$\Delta'$	$\Delta''$
$F_{-1}$	$V_{-1}$	$a'$	
$F_0$	$V_0$	$a''$	$b$
$F_{+1}$	$V_{+1}$		

Then, for the culmination at the meridian  $\lambda$

$$F_\lambda = F_0 + \lambda V_0 + \frac{\lambda^2}{48}(a' + a'') + \frac{\lambda^3 b}{864}$$

where  $\lambda$  must be expressed in hours and decimals of an hour, and reckoned from Washington or from  $180^\circ$  from Washington according as the upper or lower culmination is used for the middle value ( $F_0$ ). Adding twelve hours to the Washington time of lower transit at Washington gives the local time of upper transit at places whose longitude is  $180^\circ$  from Washington.

The column *Bright Limbs* is given to indicate to the observer which limbs are illuminated. When one limb is full and the terminator is within  $1''$  of the opposite limb, both can be well observed, and in such cases both are indicated, the defective limb being indicated by an italic letter or numeral, and the correction for defective illumination (as seen from Washington) being given in a footnote.

Pages 538–554 contain for each of the seven major planets, the *geocentric Apparent Right Ascension and Declination*, the *Horizontal Parallax*, *Semidiameter*, *Sidereal Time of Semidiameter Passing Meridian*, and the *Washington Mean Time*, for the moments of all transits which it is usually desirable to observe over the meridian of Washington. The stellar magnitude at opposition for Mars, Jupiter, Saturn, Uranus, and Neptune, respectively, is given at the bottom of the page containing the ephemeris of the planet.

### PART III.—PHENOMENA.

This part gives the dates of the principal astronomical phenomena of the year, expressed in Greenwich mean time, except in the case of the occultations visible at Washington, where Washington time is used.

Pages 556–563 contain all necessary data respecting the solar and lunar eclipses which occur during the year.

The eclipse elements are given for the moment of conjunction of the Sun and Moon in right ascension, but the subsequent tables and results are computed from the exact positions of these bodies at the several instants referred to. The times and angles designated as the circumstances of a lunar eclipse remain the same throughout all parts of the Earth, and require no explanation beyond a mere statement of the fact that in computing them the geometrical

diameter of the Earth's shadow has been augmented in the proportion of 51 : 50. The principal circumstances of each total and annular eclipse of the Sun are stated in five lines, as follows:—

The line entitled "Eclipse begins" gives the Greenwich mean time at which the Moon's penumbra first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled "Central eclipse begins" gives the time when the axis of the Moon's shadow first touches the Earth, and the latitude and longitude of the point of contact follow.

The line entitled "Central eclipse at local apparent noon" gives the time when the axes of the Earth and of the shadow cone lie in the same plane. The latitude and longitude of the point where the axis of the shadow cone then cuts the Earth's surface follow, and there the eclipse will be central and the Sun will be exactly on the meridian.

The lines entitled "Central eclipse ends" and "Eclipse ends" give, respectively, the times when and the localities where these events occur, the phenomena being the converse of those denoted by the similar phrases for the beginning.

In the case of partial solar eclipses the axis of the Moon's shadow does not come into contact with the Earth, and the three lines entitled, respectively, "Central eclipse begins," "Central eclipse at local apparent noon," and "Central eclipse ends," are replaced by a single line entitled "Greatest eclipse," whereon are given the time when and the latitude and longitude where the eclipse attains its greatest magnitude. The latter phenomenon necessarily occurs with the Sun in the horizon.

*Maps of the Eclipses.*—The regions in which each eclipse is visible are shown upon the map relating to it, from which may be taken approximately, for any place, both the times of the beginning and ending of the eclipse and its magnitude. The dotted curves show the outline of the shadow for each hour of Greenwich mean time, and therefore pass through all places where the eclipse begins or ends at the hour indicated. To find the instant of beginning at any place, we determine by inspection between what pair of these curved lines the place is situated. The eclipse will then begin between the corresponding hours of Greenwich mean time; and the fraction of the hour may be determined by dividing the hour in the same proportion as the space representing it on the map is divided by the place in question. This division may be made a little more exact by allowing for the changes in the spaces as indicated by their varying width. The Greenwich mean time thus found must be reduced to local mean time by applying the longitude.

As an example, suppose we wish to find the times at which the eclipse of 1917, January 22, begins and ends at Kasan, Russia, latitude  $+55^{\circ} 50'$ , longitude  $-48^{\circ} 49'$ .

For the beginning we compare the distance of the place from the curves of  $18^h$  and  $19^h$ , and find it to correspond to about 40 minutes from the former, thus giving for the approximate time of beginning  $18^h 40^m$ ; for the end we compare the distance of the place from the curves of  $20^h$  and  $21^h$ , and find it to be about 50 minutes from the former, thus giving for the approximate time of ending  $20^h 50^m$ , and both of these results are probably correct to within 3 or 4 minutes.

Changing to local mean time, we shall have—

		Beginning.			Ending.		
		d	h	m	d	h	m
Greenwich mean time	January	22	18	40	22	20	50
Longitude east			3	15		3	15
Local mean time	January	22	21	55	23	0	5

In the case of total and annular eclipses, a fair estimate of the magnitude of the eclipse at any place may be obtained from the position thereof relative to the central line and to the limit. On the central line the eclipse is annular or total, while between the central line and the limit the maximum magnitude of the eclipse is given by the quotient of the distance of the place from the limit divided by the distance of the central line from the limit; the measurements being made upon a line drawn through the place perpendicularly to the central line.

*More Accurate Computations.*—A more accurate determination of the phases, as visible at any point of the Earth's surface, may be obtained from the Besselian elements which are given for every 10 minutes of Greenwich mean time. Their geometric signification is as follows:—

Let us imagine a plane passing through the center of the Earth, perpendicular to the right line joining the centers of the Sun and Moon. This latter line is the axis of the Moon's shadow, and the plane is called the *fundamental plane* or plane of  $xy$ . We take the intersection of this plane with that of the Earth's equator as the axis of  $x$ , and the center of the Earth as the origin of coordinates. The axis of  $y$  is perpendicular to that of  $x$ , and directed toward the north;  $x$  and  $y$  are then the coordinates of the point in which the axis of the shadow intersects the fundamental plane, and they are here expressed in terms of the Earth's equatorial radius as unity. The angle  $d$ , of which the sine and cosine are both given, is the declination of that point of the celestial sphere toward which the axis of the shadow is directed; or, in other words, it is the declination of the center of the Sun as seen from the center of the Moon. The angle  $\mu$  is the Greenwich hour-angle of this same point of the celestial sphere.

The quantities  $l_1$  and  $l_2$  are the radii of the shadow cones upon the fundamental plane,  $l_1$  corresponding to the penumbra, and  $l_2$  to the umbra, or annulus. The notation is that of CHAUVENET'S *Spherical and Practical Astronomy*, in which  $l_2$  is regarded as positive for an annular and negative for a total eclipse.

The angles  $f_1$  and  $f_2$ , the tangents of which are given, are the angles which the elements of the respective shadow cones make with the axis of the shadow; or, they are the semiangles of the two cones.

In order to facilitate interpolation to any required moment, the logarithms of  $x'$ ,  $y'$ , and  $\mu'$ , which are the changes of  $x$ ,  $y$ , and  $\mu$ , in one minute of time, are given at the bottom of the table.

The method of computing an eclipse from its Besselian elements is based on the fact that at the moments of beginning and ending the distance of the observer from the axis of the shadow or penumbra is equal to the radius of the latter at the point of observation. To find this distance and radius we proceed as follows:

(1) The coordinates of the observer,  $\xi$ ,  $\eta$ , and  $\zeta$ , together with their variations in one minute, are computed for some assumed moment of Greenwich mean time, as near as practicable to the true time of the required phase.

(2) The coordinates  $x$  and  $y$  of the axis of the shadow, together with their variations in one minute, are taken for the same moment from the tables of elements.

(3) From (1) and (2) the position and motion of the observer relative to the axis of the shadow are found.

(4) The radius of the penumbra or umbra at a distance from the fundamental plane equal to that of the observer is also computed.

(5) Then, assuming the motions to be uniform, we determine the time required for the observer to be brought to a distance from the axis of the shadow equal to this radius.

The formulæ and directions for the several steps in the computation are as follows:—

(1) Find  $\rho \cos \varphi'$  and  $\rho \sin \varphi'$ , which are the geocentric coordinates of the station referred to the Earth's equator,  $\rho$  being the distance from the center of the Earth and  $\varphi'$  the geocentric latitude. These coordinates may be computed from the following table based on the compression of the Earth adopted at the Paris Conference of 1911,  $1/297$ , by the formulæ—

$$\rho \cos \varphi' = F \cos \varphi$$

$$\rho \sin \varphi' = \frac{\sin \varphi}{G}$$

$\varphi$  being, as usual, the geographic latitude.

Table for Computing the Geocentric Coordinates of a Place.

$\varphi$	Log $F$ .	Log $G$ .
0°	0.00000	0.00293
5	0.00001 1	0.00292 1
10	0.00004 3	0.00289 3
15	0.00010 6	0.00283 6
20	0.00017 7	0.00276 7
25	0.00028 9	0.00267 9
30	0.00037 11	0.00256 11
35	0.00048 11	0.00245 11
40	0.00060 12	0.00232 12
45	0.00073 12	0.00220 12
50	0.00086 12	0.00207 12
55	0.00098 12	0.00195 12
60	0.00110 12	0.00183 12
65	0.00120 10	0.00172 10
70	0.00129 9	0.00164 9
75	0.00137 8	0.00156 8
80	0.00142 5	0.00151 5
85	0.00145 3	0.00148 3
90	0.00146 1	0.00146 2

For the assumed Greenwich mean time of computation, take from the table of elements the values of  $\sin d$ ,  $\cos d$ , and  $\mu$ . Then, with  $\lambda$  for the longitude west from Greenwich, the coordinates of the observer will be—

$$\begin{aligned}\xi &= \rho \cos \varphi' \sin (\mu - \lambda) \\ \eta &= \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos (\mu - \lambda) = \eta_1 - \eta_2 \\ \zeta &= \rho \sin \varphi' \sin d + \rho \cos \varphi' \cos d \cos (\mu - \lambda) = \zeta_1 + \zeta_2\end{aligned}$$

and their variations in one minute of mean time will be—

$$\begin{aligned}\xi' &= [7.63992] \rho \cos \varphi' \cos (\mu - \lambda) \\ \eta' &= [7.63992] \rho \cos \varphi' \sin d \sin (\mu - \lambda) = [7.63992] \xi \sin d \\ \xi' &\text{ is not needed.}\end{aligned}$$

(2) For the same assumed moment of Greenwich mean time, take from the tables of elements the coordinates  $x$  and  $y$  of the axis of the shadow, together with their variations for one minute, which are equal to one-tenth of the differences of two consecutive numbers. These variations are represented by  $x'$  and  $y'$ , and their logarithms are given beneath the tables of  $x$  and  $y$ .

(3) The distance  $m$  and position-angle  $M$  of the axis of the shadow relative to the observer, and the relative motions,  $n$  and  $N$ , are computed by the formulæ—

$$\begin{aligned}m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta'\end{aligned}$$

(4) Both for the shadow and for the penumbra, the radius  $L$  at the distance  $\zeta$  from the fundamental plane is computed by the formulæ—

$$L = l - \zeta \tan f$$

$l$  and  $f$  being taken from the table of elements, and  $\zeta$  computed in (1).

(5) If the time chosen for computation is exactly that of the beginning or ending of the eclipse, we shall have—

$$m = L.$$

But, as this condition will rarely be fulfilled on a first trial, a correction  $\tau$  to the assumed time is computed thus: Find the angle  $\psi$  from the equation—

$$\sin \psi = \frac{m \sin (M - N)}{L}$$

There will be two values for this angle, of which one will be in the first and the other in the second quadrant when  $\sin \psi$  is positive, and one in the third and the other in the fourth quadrant when  $\sin \psi$  is negative; but simplicity will be gained by taking only that value of  $\psi$  for which  $\cos \psi$  is positive. This value lies between the limits  $+90^\circ$  and  $-90^\circ$ . The correction  $\tau$  to the assumed time of beginning or ending of the eclipse will then be found, in minutes, from—

$$\tau = -\frac{m \cos (M - N)}{n} \mp \frac{L \cos \psi}{n}$$

where the double sign is to be taken negative for the beginning and positive for the ending.

However, one such pair of values of  $\tau$  can not give the times of both beginning and ending with accuracy. To attain that, we must commence the computation by assuming two times, one near the beginning and the other near the ending of the eclipse, both of which may be derived from the chart with sufficient exactness. The computation for the first assumed time will give a small value of  $\tau$  which, when applied to the assumed time, will give



the beginning of the eclipse nearly correctly, and a large value which will give an inaccurate time of ending. Similarly, the computation for the second assumed time will give a small and nearly correct value of  $\tau$  for finding the time of ending, and a large and inaccurate negative value for finding the time of beginning. We shall thus deduce two times of each phase, only one of which is to be regarded as approximately correct.

The more accurate times of beginning and ending may now be taken in place of those originally assumed, and the whole computation may be repeated, thus leading to a pair of values of  $\tau$ , which should be very small and accurate. Such a repetition of the computation will in general be advisable, to guard against accidental numerical errors, but a second approximation may be obtained without it, by finding a corrected value of  $\tau$  in accordance with the formulæ—

$$\delta\tau = \mp \frac{\tau(l' + [5.3100]\xi \cos d)}{n \cos \psi} - \frac{[4.9788]\tau^2}{n \cos \psi} [\xi \sin (N \mp \psi) - \eta_2 \cos (N \mp \psi)]$$

$$\tau_0 = \tau + \delta\tau$$

where the double signs are to be taken negative for the beginning of the eclipse and positive for the ending.  $l'$  is the variation of  $l$  for one minute of time, and its numerical value can be taken by inspection from the table of Besselian elements.

If the resulting values of  $\tau_0$  are not greater than fifteen minutes, the corrected times of contact thus obtained will be theoretically exact within less than a second, but the uncertainties of the solar and lunar tables are such that an unavoidable error of several seconds may exist in the prediction. To guard against numerical mistakes it is better, after making this final correction, to repeat the computations so far as to obtain new values of  $m$  and  $L$  for the corrected times. If these two quantities agree within a unit of the fourth place of decimals, the times employed are generally correct within a second of time. If they differ too widely, the computer must use his own judgment as to making further corrections and computations.

*Position-angle of Point of Contact.*—The position-angle  $P$ , of the point of contact, reckoned from the north point of the Sun's limb toward the east, is found by the formulæ—

$$P = N - \psi \pm 180^\circ \text{ for the beginning,}$$

$$\text{or } P = N + \psi \quad \text{for the ending,}$$

it being assumed that, in each case, the value of  $\psi$  is taken between the limits  $\pm 90^\circ$ .

*Computation of the Solar Eclipse of 1917, January 22, for Kasan, Russia.*

The position of Kasan is—

$$\begin{array}{rcl} \text{Latitude, } \varphi & = & +55^\circ 50' 20'' \\ \text{Longitude, } \lambda & = & -48^\circ 49' 8'' \end{array}$$

and its geocentric coordinates are—

$$\begin{array}{l} \rho \sin \varphi' = 9.91582 \\ \rho \cos \varphi' = 9.75037 \end{array}$$

From the Eclipse Chart we find the approximate times of the phases to

3—

Beginning Ending	January	d 22	h 18	m 40	} Greenwich Mean Time.			
		22	20	50				
	<i>T</i>	Jan. 22,	Beginning. 18 <sup>h</sup> 40 <sup>m</sup>			Ending. 20 <sup>h</sup> 50 <sup>m</sup>		
			°	'	"	°	'	"
$\mu$			277	1	42	309	31	30
$\lambda$			- 48	49	8	- 48	49	8
$\mu - \lambda$			+325	50	50	+358	20	38
$\rho \cos \varphi'$			9.75037			9.75037		
$\sin (\mu - \lambda)$			9.74927	<i>n</i>		8.46091	<i>n</i>	
$\log \xi$			9.49964	<i>n</i>		8.21128	<i>n</i>	
$\xi$			-0.31597			-0.01627		
$\rho \sin \varphi'$			9.91582			9.91582		
$\cos d$			9.97417			9.97423		
$\log \eta_1$			9.88999			9.89005		
$\eta_1$			+0.77623			+0.77633		
$\rho \cos \varphi'$			9.75037			9.75037		
$\sin d$			9.52487	<i>n</i>		9.52445	<i>n</i>	
$\cos (\mu - \lambda)$			9.91780			9.99982		
$\log \eta_2$			9.19304	<i>n</i>		9.27464	<i>n</i>	
$\eta_2$			-0.15597			-0.18821		
$\eta = \eta_1 - \eta_2$			+0.93220			+0.96454		
$\rho \sin \varphi' \sin d$			9.44069	<i>n</i>		9.44027	<i>n</i>	
$\zeta_1$			-0.27586			-0.27559		
$\rho \cos \varphi' \cos d \cos (\mu - \lambda)$			9.64234			9.72442		
$\zeta_2$			+0.43887			+0.53018		
$\zeta = \zeta_1 + \zeta_2$			+0.16301			+0.25459		
const. log.			7.63992			7.63992		
$\rho \cos \varphi' \cos (\mu - \lambda)$			9.66817			9.75019		
$\log \xi'$			7.30809			7.39011		
$\xi'$			+0.002033			+0.002455		
const. log.			7.63992			7.63992		
$\xi \sin d$			9.02451			7.73573		
$\log \eta'$			6.66443			5.37565		
$\eta'$			+0.000462			+0.000024		
$x - \xi$			-0.49777			+0.39785		
$y - \eta$			+0.00719			+0.38000		
$x' - \xi'$			+0.007163			+0.006739		
$y' - \eta'$			+0.002652			+0.003095		
$m \sin M$			9.69703	<i>n</i>		9.59972		
$m \cos M$			7.85673			9.57978		
$\tan M$			1.84030	<i>n</i>		0.01994		
$M$			270° 49' 39"			46° 18' 54"		
$\sin M$			9.99995	<i>n</i>		9.85923		
$\log m$			9.69708			9.74049		
$n \sin N$			7.85509			7.82860		
$n \cos N$			7.42357			7.49066		
$\tan N$			0.43152			0.33794		

	Beginning. 69° 41' 2"	Ending. 65° 19' 56"
$N$		
$\sin N$	9.97210	9.95844
$\log n$	7.88299	7.87016
$\tan f$	7.67665	7.67664
$\log \zeta$	9.21222	9.40684
	6.88887	7.08248
$\zeta \tan f$	+0.00077	+0.00121
$l$	+0.53797	+0.53792
$L$	+0.53720	+0.53671
$M-N$	201° 8' 37"	340° 58' 58"
$\sin (M-N)$	9.55715 $n$	9.51302 $n$
$\log m$	9.69708	9.74049
$\text{colog } L$	0.26986	0.27026
$\sin \psi$	9.52409 $n$	9.52378 $n$
$\psi$	-19° 31' 40"	-19° 30' 48"
$\log \frac{m}{n}$	1.81409	1.87033
$\cos (M-N)$	9.96973 $n$	9.97563
	1.78382 $n$	1.84596
$-\frac{m}{n} \cos (M-N)$	+60.789	-70.139
$\log L$	9.73014	9.72974
$\cos \psi$	9.97427	9.97431
$\text{colog } n$	2.11701	2.12984
	1.82142	1.83389
$\mp \frac{L \cos \psi}{n}$	-66.286	+68.217
$\tau$	- 5.497	- 1.922
$T+\tau$	d h m 22 18 34.503	d h m 22 20 48.078

Since the value of  $\tau$  for the beginning is rather large, we compute the correction  $\delta\tau$  for this phase as follows:

	Beginning.		Beginning.
const. log	5.3100	$\cos (N-\psi)$	8.1358
$\log \xi$	9.4996 $n$	$\log \eta_2$	9.1930 $n$
$\cos d$	9.9742	$\log \eta_2 \cos (N-\psi)$	7.3288 $n$
	4.7838 $n$	$\xi \sin (N-\psi)$	-0.3160
number	-0.0000061	$\eta_2 \cos (N-\psi)$	-0.0021
$l'$	0.0000000	diff.	-0.3139
sum	-0.0000061	$\log (\text{diff.})$	9.4968 $n$
$\log (\text{sum})$	4.7838 $n$	const. log	4.9788 $n$
$\log (-r)$	0.7401	$\log r^2$	1.4802
$\text{colog } n$	2.1170	$\text{colog } (n \cos \psi)$	2.1427
$\sec \psi$	0.0257		8.0985
	7.6666 $n$	(2)	+0.0125
(1)	-0.0046		
$N-\psi$	89° 13'	(1)+(2)= $\delta\tau$	+0.0079
$\sin (N-\psi)$	0.0000	$r$	-5.497
$\log \xi$	9.4996 $n$	$\tau_0$	-5.489
$\log \xi \sin (N-\psi)$	9.4996 $n$		

The corrected time of beginning is, therefore,

$$T_0 = \text{January } 22^{\text{d}} 18^{\text{h}} 34^{\text{m}}.511$$

Whence we find—

	Beginning.	Ending.
	d h m	d h m
Greenwich Mean Time, January	22 18 34.511	22 20 48.078
$\lambda$	— 3 15.276	— 3 15.276
Local Mean Time, January	22 21 49.787	23 0 3.354

Therefore we have—

Beginning of the Eclipse, January	d h m s	} Local Mean Time.
End of the Eclipse, January	22 21 49 47.2	
	23 0 3 21.2	
	Beginning.	Ending.
$N \mp \phi$	89 12.7	45 49.1
constant	180 0.0	0 0.0
Angle of position, $P$	269 12.7	45 49.1

from the north point of the Sun's disk toward the east for direct image.

Pages 564–568 contain the adopted mean places and annual proper motions of such stars, as bright as magnitude 6.5, as will be occulted during the year by the Moon.

Pages 569–610 contain the elements for the prediction of the times of occultations of stars and planets by the Moon during the current year. The system of coordinates employed is similar to that already described for eclipses, the fundamental plane passing through the center of the Earth, and being taken perpendicular to the line joining the star and the center of the Moon, but the cone circumscribing the Moon and star is regarded as a cylinder which intercepts the fundamental plane in a circle having the same linear diameter as the Moon.

In the columns referring to the star, those headed *Red'ns from 1917.0* give the quantities necessary to reduce the mean place of the star at the beginning of 1917 to its apparent place at the time of occultation. These reductions are sufficiently accurate to be definitive.

Under the general head, *At Conjunction in R. A.*, are five columns giving certain quantities for the moment of geocentric conjunction of the Moon and star in right ascension, as follows:

The *Greenwich Mean Time* is the moment,  $T$ , at which the two bodies are in geocentric conjunction in right ascension. At that moment the coordinate  $x$  of the axis of the cylinder on the fundamental plane has the value zero. The column *Hour Angle,  $H$* , gives the common geocentric hour-angle of the Moon and star at the same moment, expressed in sidereal time and counted from the meridian of Greenwich—positive toward the west and negative toward the east. Column  $Y$  gives the coordinate  $y$  of the axis of the cylinder upon the fundamental plane at the same moment. Columns  $x'$  and  $y'$  give the variations of  $x$  and  $y$  in one hour of mean time. The linear unit in these columns is the Earth's equatorial radius. The limiting parallels, north and south, show the extreme limits of latitude within which the occultation will be visible.

By the aid of these elements, the time of immersion and emersion of a star relative to the limb of the Moon may be computed for any part of the Earth by a method nearly the same as that already explained for computing eclipses, but somewhat more simple.

*Prediction of Occultations for a given Place.*—When it is desired to predict the circumstances of one or more occultations at any place, the first step will be to select them from the general list given in the Ephemeris. The conditions of visibility are:—

1. The limiting parallels in the last columns must include the latitude of the place.

2. The quantity  $H - \lambda$ , taken without regard to sign, must be less than the semidiurnal arc of the star by at least one hour. On very rare occasions an emersion might be seen in the east, or an immersion in the west, when this difference is a few minutes less than an hour.

3. The Sun must not be much more than an hour above the horizon at the local mean time  $T - \lambda$ , unless the star is bright enough to be seen in the daytime.

When many occultations are to be selected, the most convenient course will be to write the value of  $-\lambda$  on the bottom of a slip of paper, and in passing through the list of occultations to pause over each one for which condition (1) is fulfilled, and examine by means of the slip whether conditions (2) and (3) are also fulfilled. If either fails, the computer passes on. Sometimes it will be difficult to determine whether  $H - \lambda$  or  $T - \lambda$  falls within the limits; and in such cases the computer may mark the occultation for trial and leave the decision for the subsequent operations. The whole list can be gone over in less than a day, and it will probably be found that about one-tenth of the occultations are marked for trial.

The next step will be to compute the local times of immersion and emersion from the elements, and to that end let—

$T$  = the instant of geocentric conjunction of Moon and star in right ascension, expressed in Greenwich mean time;

$H$  = the Greenwich west hour-angle of the two bodies at that moment;

$\lambda$  = the longitude west of Greenwich;

$h_0 = H - \lambda$  = the local hour-angle of the star at the instant  $T$ ;

$\delta$  = the star's declination.

The procedure for each occultation will then be as follows:—

(1) The geocentric coordinates of the place,  $\rho \sin \varphi'$  and  $\rho \cos \varphi'$ , are to be computed by the formulæ and table given in connection with eclipses on page 724.

The next step will be to find the approximate instant of apparent conjunction of the Moon and star as seen from the place, and that may be deduced from the time of geocentric conjunction by the application of an approximate correction taken from DOWNES's table, printed in the volumes of the American Ephemeris for 1882 to 1899. This correction must be reckoned in mean solar hours, and will be designated by the symbol  $t$ . It will have the same sign as  $h_0$ .

When DOWNES's table is not available, the correction may be computed from the formulæ—

$$\xi_0 = \rho \cos \varphi' \sin h_0$$

$$\xi' = [9.4192] \rho \cos \varphi' \cos \frac{4}{3} h_0$$

$$t = \frac{\xi_0}{\xi' - \xi_0}$$

By applying  $t$  to the Greenwich mean time of geocentric conjunction, as given with the elements, we shall have the Greenwich mean time of local conjunction within a few minutes.

(2) Compute for the instant  $T+t$  the following quantities, in which  $t_0$  is the sidereal equivalent of the mean time interval  $t$ :

$$\begin{aligned}\xi &= \rho \cos \varphi' \sin (h_0 + t_0) \\ \eta &= \rho \sin \varphi' \cos \delta - \rho \cos \varphi' \sin \delta \cos (h_0 + t_0) = \eta_1 - \eta_2 \\ \xi' &= [9.4192] \rho \cos \varphi' \cos (h_0 + t_0) \\ \eta' &= [9.4192] \rho \cos \varphi' \sin \delta \sin (h_0 + t_0) = [9.4192] \xi \sin \delta \\ x &= x't \\ y &= Y + y't\end{aligned}$$

Compute also  $m$ ,  $M$ ,  $n$ ,  $N$ , and  $\psi$  from the equations,

$$\begin{aligned}m \sin M &= x - \xi \\ m \cos M &= y - \eta \\ n \sin N &= x' - \xi' \\ n \cos N &= y' - \eta' \\ \sin \psi &= [0.5646] m \sin (M - N)\end{aligned}$$

$\psi$  being taken between the limits  $\pm 90^\circ$ . Finally compute,

$$\begin{aligned}\tau &= \frac{[1.7782]m}{n} \cos (M - N) \mp \frac{[1.2135]}{n} \cos \psi \\ \delta\tau &= \frac{[6.7591]\tau^2}{n \cos \psi} [\eta_2 \cos (N \mp \psi) - \xi \sin (N \mp \psi)]\end{aligned}$$

where the double signs are to be taken negative for an immersion and positive for an emersion. Both  $\tau$  and  $\delta\tau$  thus have two values, which are expressed in minutes of time, and in order to distinguish them let those pertaining to immersion be designated, respectively,  $\tau'$  and  $\delta\tau'$ , while those pertaining to emersion are designated  $\tau''$  and  $\delta\tau''$ . We then have for the Greenwich mean times of the phases,

$$\begin{aligned}\text{Instant of immersion} &= T + t + \tau' + \delta\tau' \\ \text{Instant of emersion} &= T + t + \tau'' + \delta\tau''\end{aligned}$$

These expressions are practically exact, as the corrections  $\delta\tau$  seldom amount to so much as 1.5 minutes, and whenever an inaccuracy of that magnitude is permissible they may be omitted. As a check upon the results it will be advisable to compute  $\xi$ ,  $\eta$ ,  $x$ , and  $y$  for the times of immersion and emersion finally obtained. If these times are correct, the quantities in question will fulfill the condition,

$$\sqrt{(x - \xi)^2 + (y - \eta)^2} = 0.2725$$

If  $\log m \sin (M - N) > 9.4354$ ,  $\sin \psi$  will be numerically greater than unity, and no occultation is to be expected at the given place; but a very brief one may occur if the excess of the computed distance over the Moon's semi-diameter happens to be within the errors of the ephemerides of the Moon and star.

The position-angle of the line from the Moon's center to the star, at the time of contact, is reckoned from the north point toward the east, and designated by the symbol  $P$ . It is computed from the formulæ—

$$\begin{aligned}P &= N - \psi + \delta P && \text{for immersion,} \\ \text{or } P &= N + \psi + \delta P \pm 180^\circ && \text{for emersion,}\end{aligned}$$

where the angles  $N-\phi$  and  $N+\phi$  are taken directly from the computation of  $\delta\tau$ , and  $\delta P$  is found in degrees of arc from the expression,

$$\delta P = \mp \frac{[7.3038]r^2}{\cos \phi} \{ \eta_2 \sin N + \xi \cos N \}$$

In the latter formula the double sign is to be taken negative for an immersion and positive for an emersion.

The angle from the vertex,  $V$ , is also reckoned in the direction from the north toward the east, and is found from the formula

$$V = P - C$$

where  $C$  is computed from the expression,

$$\tan C = \frac{\xi + [8.2218]\tau\xi' - [4.9810]\tau^2\xi}{\eta + [8.2218]\tau\eta' + [4.9810]\tau^2\eta_2}$$

$C$  being taken less or greater than  $180^\circ$ , according as the numerator is positive or negative.

The value of  $\tau$  employed in the latter formula must be so taken as to correspond with the phase for which  $C$  is required.

In the volumes of the *American Ephemeris* for the years 1882 to 1901 instructions are given for constructing three special tables which greatly diminish the labor of computing occultations, but as these tables should contain from 4700 to 6300 quantities, and as they would apply only to the place for which they were computed, it will rarely be worth while to undertake the labor of forming them. Those who desire further information on the subject may consult any one of the volumes in question.

As an example of an isolated occultation, we will compute that of 89 B. Leonis on March 6, 1917, for Evanston, Ill., whose position is—

$$\begin{aligned} \phi &= +42^\circ \quad 3' \quad 33''.4 \\ \lambda &= +5^h \quad 50^m \quad 42^s.3 \end{aligned}$$

and whose geocentric coordinates are—

$$\begin{aligned} \rho \sin \phi' &= 9.8237 \\ \rho \cos \phi' &= 9.8713 \end{aligned}$$

From the elements on page 576 we have,

$$\begin{aligned} T &= \begin{matrix} h & m \\ 17 & 10.0 \end{matrix} \\ H &= +6 \quad 13.6 \\ h_0 &= H - \lambda = +0 \quad 22.9 \end{aligned}$$

and

From the formulæ on page 730, we find the correction,  $t$ , to the Greenwich mean time of geocentric conjunction,  $T$ , to be about  $+0^h \ 14^m.4$ ; therefore the Greenwich mean time of apparent conjunction is—

$$T+t = \text{March } 6^d \ 17^h \ 24^m.4$$

89 B. Leonis.	Apparent	G. M. T. of $\odot$	Hour Angle.	$Y$	$\tau$	$\sigma$
	Declination.	d h m	h m			
	+8 42.4	Mar. 6 17 10.0	+6 13.6	+0.7506	0.5032	-0.2220

$T+t$	Mar. 6 <sup>d</sup> 17 <sup>h</sup> 24 <sup>m</sup> 4	$x-\xi$	+0.0003
$h_0$	+ 0 22.9	$y-\eta$	+0.1497
$t_0$	+ 0 14.4	$x'-\xi'$	+0.3106
$h_0+t_0$	+ 0 37.3	$y'-\eta'$	-0.2268
$\rho \cos \varphi'$	9.8713	$m \sin M$	6.4771
$\sin (h_0+t_0)$	9.2096	$m \cos M$	9.1752
$\log \xi$	9.0809	$\tan M$	7.3019
$\xi$	+0.1205	$M$	0° 7'
$\rho \sin \varphi'$	9.8237	$\cos M$	0.0000
$\cos \delta$	9.9980	$\log m$	9.1752
$\log \eta_1$	9.8187	$n \sin N$	9.4922
$\eta_1$	+0.6587	$n \cos N$	9.3556 $n$
$\rho \cos \varphi'$	9.8713	$\tan N$	0.1366 $n$
$\sin \delta$	9.1801	$N$	126° 8'
$\cos (h_0+t_0)$	9.9942	$\sin N$	9.9072
$\log \eta_2$	9.0456	$\log n$	9.5850
$\eta_2$	+0.1111	const. log	0.5646
$\eta_1-\eta_2=\eta$	+0.5476	$\log m$	9.1752
const. log	9.4192	$\sin (M-N)$	9.9079 $n$
$\rho \cos \varphi' \cos (h_0+t_0)$	9.8655	$\sin \phi$	9.6477 $n$
$\log \xi'$	9.2847	$\phi$	-26° 23'
$\xi'$	+0.1926	const. log	1.7782
const. log	9.4192	$\log \frac{m}{n}$	9.5802
$\xi \sin \delta$	8.2610	$\cos (M-N)$	9.7694 $n$
$\log \eta'$	7.6802		1.1378 $n$
$\eta'$	+0.0048	$\frac{[1.7782]m}{n} \cos (M-N)$	+13.73
$\log x'$	9.7018	const. log	1.2135
$\log t$	9.8802	colog $n$	0.4150
$\log x$	9.0820	$\cos \phi$	9.9522
$x$	+0.1208		1.5807
$\log y'$	9.3464 $n$	$\frac{[1.2135] \cos \phi}{n}$	$\mp 38.08$
$\log y't$	8.7266 $n$	$\epsilon$ for immersion	-24.35
$y't$	-0.0533	$x$ for emission	+51.81
$Y$	+0.7506		
$y$	+0.6973		

The computation of  $\delta\tau$  for the two contacts is as follows:

	Immersion.	Emission.
$N \mp \phi$	152° 31'	90° 45'
$\cos (N \mp \phi)$	9.9480 $n$	9.2288 $n$
$\log \eta_2$	9.0456	9.0456
$\log (1)$	8.9936 $n$	8.2744 $n$
(1)	-0.0985	-0.0188
$\sin (N \mp \phi)$	9.6642	9.9937
$\log \xi$	9.0809	9.0809
$\log (2)$	8.7451	9.0746
(2)	+0.0556	+0.1187
(1)-(2)	-0.1541	-0.1375
$\log [(1)-(2)]$	9.1878 $n$	9.1383 $n$
const. log	6.7591	6.7591
$\log \tau^2$	2.7730	3.4288
colog ( $n \cos \phi$ )	0.4628	0.4628
$\log \delta\tau$	9.1827 $n$	9.7890 $n$



		Immersion.			Emersion.	
		m			m	
	$\delta r$	- 0.15			- 0.62	
	$r + \delta r$	- 24.50			+ 51.19	
	$T + t$	Mar.	d	h	m	
			6	17	24.4	17 24.4
Greenwich Mean Time of Phase,		"	6	18	59.9	18 15.6
	$\lambda$		+ 5		50.7	+ 5 50.7
Evanston Mean Time		Mar.	6	11	9.2	12 24.9
To find $\delta P$ and $P$ :						
	$\log \eta_2$	9.0456		$\log \xi$	9.0809	(3) +0.0897
	$\sin N$	9.9072		$\cos N$	9.7706 n	(4) -0.0710
	$\log (3)$	8.9528		$\log (4)$	8.8515 n	(3)+(4) +0.0187
	$\log [(3)+(4)]$			Immersion.	8.2718	Emersion.
	const. log				7.3038 n	7.3038
	$\log r^2$				2.7730	3.4288
	$\csc \cos \psi$				0.0478	0.0478
	$\log \delta P$				8.3964 n	9.0522
	$\delta P$				0.0	+0.1
	$N \mp \psi$				152.5	99.8
	constant				0.0	180.0
Angle of position, $P$					152.5	279.9

from the north point of the Moon's limb toward the east, for direct image.

Pages 611-613 contain in detail all the data necessary for observing every occultation of the general list which is visible at Washington during the current year.

Page 614 contains the *Ephemeris for Physical Observations of the Sun*.

Page 615 contains certain elements referring to the Moon, its equator, and its orbit.

$i$  = the inclination of the Moon's mean equator to the Earth's true equator.

$\Delta$  = the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic of date.

$\Omega'$  = the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator.

$l'$  = the longitude of the perigee of the Moon's orbit, referred to the mean equinox of date.

$\Omega$  = the longitude of the ascending node of the Moon's orbit on the ecliptic, referred to the mean equinox of date.

$\zeta$  = the Moon's mean longitude, referred to the mean equinox of date.

Pages 616-623 contain the *Ephemeris for Physical Observations of the Moon*.

The selenographic longitudes are measured in the plane of the Moon's equator, the axis of reference being the radius of the Moon which passes through the mean center of the visible disk positive toward the west—i. e., toward Mare Crisium—and the latitudes are measured from the Moon's equator, positive toward the north—i. e., in the hemisphere containing Mare Serenitatis.

The optical and physical librations in longitude and latitude have been computed with elements and formulæ given on page xiii, and their sums are given in the second and third columns, respectively, the physical libration being given separately in the fourth and fifth columns. The Sun's selenographic colongitude ( $90^\circ$ —longitude) and latitude and the position-angle of the Moon's axis,  $C$ , in the sixth, seventh, and eighth columns, respectively, have all been corrected for the effect of physical libration.

When the libration in longitude is positive, the mean center of the disk is displaced toward the east—that is, the region thus exposed to view is on the west limb—and when the libration in latitude is positive the mean center of the disk is displaced toward the south—that is, the region thus exposed to view is on the north limb.

The altitude of the Sun,  $A$ , at any given time above the horizon of any point on the Moon whose selenographic longitude and latitude,  $\lambda$  and  $\beta$ , are known, may be computed from the following formula, the Sun's selenographic longitude and latitude being denoted by  $l_{\odot}$  and  $b_{\odot}$ , respectively:

$$\sin A = \sin b_{\odot} \sin \beta + \cos b_{\odot} \cos \beta \cos (l_{\odot} - \lambda)$$

Pages 624–625 contain the data with reference to the illuminated disks of Mercury and Venus. The angle  $\theta$  is the angle which the arc of the great circle from the planet to the Sun makes with the arc from the planet toward the west, measured in the direction west, north, east, south. It is measured from  $0^{\circ}$  to  $360^{\circ}$ . We may also regard  $\theta$  as expressing the angle which the line of cusps makes with the meridian, the positive direction of the meridian being toward the north, and the positive direction of the line of cusps that in which a person following this line would have the illuminated portion of the disk on his right.

Pages 626–627 contain the *Ephemeris for Physical Observations of Mars*. The quantities here given have been corrected for aberration, so that in using them they should be interpolated to the actual time of observation.

$P$  = the position-angle of the axis of rotation measured eastward from the north point of the disk.

$A_{\oplus}$ ,  $A_{\odot}$  = the planetocentric right ascensions of the Earth and Sun, respectively, measured in the plane of the planet's equator from its vernal equinox.

$D_{\oplus}$ ,  $D_{\odot}$  = the planetocentric declinations of the Earth and Sun, respectively, referred to the planet's equator.

$\odot \delta$  = the planetocentric longitude of the Sun measured in the plane of the planet's orbit from its vernal equinox.

$k$  = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

$i$  = the angle between the Sun and the Earth as seen from the planet.

$q$  = the angular value of the greatest defect of illumination as seen from the Earth.

$Q$  = the position-angle of the radius of the disk which passes through the point of greatest defect of illumination—that is, of the radius perpendicular to the line joining the cusps. It is measured eastward from the north point of the disk.

The column headed *Central Meridian* contains the longitude of the meridian which bisects the disk, measured from the adopted zero meridian.

The columns headed *Mean Time of Transit of Zero Meridian* contain the Greenwich Mean Time of every transit of the zero meridian across the actual center of the disk.

Pages 628–631 contain the *Ephemeris for Physical Observations of Jupiter*.

The columns headed *Central Meridian* contain the longitudes of the meridian which bisects the disk, measured from the adopted zero meridian of System I and System II, respectively.

The column headed *Correction for Phase* contains the corrections to be applied to the longitudes of the central meridian to obtain the longitudes of the meridian bisecting the illuminated disk.

The quantities in the remaining columns on pages 628-629 are the same as those defined under the *Ephemeris for the Physical Observations of Mars*.

Page 658 contains the *Magnitude of Saturn* and the *Elements of the Rings*.

$B$  = the Saturnicentric latitude of the Earth referred to the plane of the rings, positive towards the north.

 $\omega$  = the distance in the plane of the rings from their ascending node on the Earth's equator to their ascending node on the ecliptic.

$B'$  = the Saturnicentric latitude of the Sun referred to the plane of the rings, positive towards the north.

$U' + 180^\circ$  — the Saturnian longitude of the Sun measured in the plane of the rings from their ascending node on the ecliptic.

Page 668 contains the diagram of the orbits of the satellites of Uranus, together with the times of their elongations.

Pages 669-670 contain tables for predicting the position-angles and distances from the center of the planet of the satellites of Uranus and Neptune.

Page 671 contains the diagram of the orbit of the satellite of Neptune, together with the times of its elongations.

Pages 672-673 contain the *Phenomena*, or the configurations of the Sun, Moon, and planets, expressed in the symbols of page xx. The predicted times of the conjunctions, quadratures, and oppositions of the planets with respect to the Sun are, respectively, the instants when the longitude of each planet differs from that of the Sun by  $0^\circ$ ,  $\pm 90^\circ$ , or  $180^\circ$ . For the conjunction of the planets with the Moon and with each other, the predicted times are the instants when the two bodies have the same right ascension. In the case of conjunction the degrees and minutes to the right indicate the difference of declination. Thus,  $\delta \text{ } \S \text{ } \subset \dots \text{ } \S - 4^\circ 22'$  would be read "Conjunction of Mars with the Moon. Mars  $4^\circ 22'$  to the South."

These pages contain also the beginning of the seasons; the perihelia and aphelia of the planets, including the Earth; the passage of the planets through the nodes of their orbits upon the ecliptic; and the date of lunar and solar *eclipses*, with their aspect as seen from Washington.

Pages 674-683 contain the *Positions of Observatories*, together with a list of the authorities from which the positions are obtained. The tabular arrangement is self-explanatory.

Page 684 contains two examples in the computation of lunar distances, which are inserted because lunar distance tables are no longer published.

Pages 685-709 contain a series of tables numbered from I to VII.

Table I—For Finding the Latitude by an Observed Altitude of Polaris.

Table II—For converting Sidereal into Mean Solar Time.

Table III—For converting Mean Solar into Sidereal Time.

Table IV—For Finding the Azimuth of Polaris at All Hour Angles.

Table V—For Finding the Azimuth of Polaris at Elongation.

Table VI—For Finding the Times of Upper and Lower Culmination of Polaris.

Table VII—For finding the Apparent Place, Time of Upper Culmination, and Time Interval between Upper Culmination and Elongation, of Polaris.

39398°—1917—47

# 738 INDEX TO APPARENT PLACES OF STARS, 1917.

Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.
Andromedæ.	Aquarii.	Argus.	Boëtis.	Can. Maj.	Cassiope.	Ceti.
$\alpha$ 316	$b^1$ 507	$\psi$ 395	$f$ 429	$\xi^2$ 372	36 H. 336	$\theta$ 326
$\beta$ 324	$c^2$ 504		11 426	$o^2$ 376	38 327	$\iota$ 317
$\gamma$ 332	$i^1$ 510	Arietis.	33 431		40 327	$\mu$ 338
$\delta$ 320				Can. Min.	50 332	$\nu$ 336
$\epsilon$ 320	Aquilæ.	$\alpha$ 332	Bradley.	$\alpha$ 381	55 333	$\xi^1$ 333
$\zeta$ 321		$\beta$ 331		$\beta$ 380		$\xi^2$ 336
$\iota$ 509	$a$ 476	$\delta$ 343	1147 385		Centauri.	$o$ 335
$\kappa$ 510	$\beta$ 477	$\epsilon$ 340	1672 235		$\alpha^2$ 431	$\pi$ 338
$\lambda$ 509	$\gamma$ 475	$\zeta$ 344	2777 487	Can. Ven.	$\beta$ 426	$\sigma$ 336
$\mu$ 323	$\delta$ 472	$\nu$ 337		$\alpha$ 420	$\gamma$ 418	$\tau$ 329
$o$ 503	$\epsilon$ 469	$\sigma$ 339	Camelopard.	2 415	$\delta$ 413	$v$ 331
$\pi$ 319	$\zeta$ 469	$\tau$ 344	$\beta$ 358	8 416	$\epsilon$ 424	2 513
$\sigma$ 317	$\eta$ 476	41 339	4 356	17 H. 423	$\zeta$ 425	12 319
$v$ 327	$\theta$ 478		9 357	20 421	$\eta$ 431	13 319
$\psi$ 511	$\kappa$ 474	Aurigæ.	17 362		$\theta$ 427	20 322
22 317	$\lambda$ 470	$\alpha$ 361	43 374	Capricorni.	$\iota$ 422	67 334
	$\mu$ 473	$\beta$ 367	2 H. 346	$\alpha^2$ 479	$\lambda$ 410	
Antliæ.	$\tau$ 478	$\delta$ 367	5 H. 348	$\beta$ 479	$\pi$ 409	Chamæleon.
	$\omega$ 472	$\epsilon$ 358	9 H. 349	$\gamma$ 492	$n$ 419	$\beta$ 415
$\alpha$ 401	1 465	$\zeta$ 358	19 H. 360	$\delta$ 492		$\delta^2$ 404
$\theta$ 396	2 466	$\eta$ 359	22 H. 369	$\zeta$ 490	Cephei.	$\zeta$ 234
$\iota$ 405	6 467	$\theta$ 368	23 H. 372	$\theta$ 486	$\alpha$ 489	$\theta$ 387
		$\iota$ 357	25 H. 233	$\iota$ 489	$\beta$ 491	$\pi$ 411
Apodis.	Aræ.	$\lambda$ 361	30 H. 234	$\mu$ 493	$\gamma$ 510	
$\alpha$ 432	$\alpha$ 455	$\mu$ 360	32 H. 235	$\pi$ 480	$\zeta$ 496	Cæli.
$\gamma$ 447	$\beta$ 454	$\nu$ 366		$\rho$ 480	$\eta$ 484	$\alpha$ 356
$\delta^1$ 444	$\delta$ 455	$o$ 365	Cancræ.	$v$ 482	$\theta$ 481	
$\theta$ 425	$\epsilon^1$ 451	$\chi$ 363	$\alpha$ 391	$\psi$ 483	$\iota$ 502	Columbæ.
59 G. 236	$\theta$ 461	$\psi^1$ 370	$\beta$ 386		$\kappa$ 479	$\alpha$ 365
		$\psi^5$ 374	$\gamma$ 389	Carinæ.	$o$ 506	$o$ 361
Aquarii.	Argus.	51 372	$\delta$ 389	$b^1$ 391	$\pi$ 504	
$\alpha$ 494	$\alpha$ 371	63 377	$\zeta$ 385		11 492	Comæ.
$\beta$ 491	$\beta$ 393		$\eta$ 388		20 495	
$\gamma$ 497	$\gamma$ 385	Boëtis.	$\iota$ 389	Cassiope.	24 496	20 416
$\delta$ 502	$\delta$ 390	$\alpha$ 428	$\kappa$ 392	$\alpha$ 320	39 H. 238	24 417
$\epsilon$ 484	$\epsilon$ 386	$\beta$ 435	$\sigma^2$ 390	$\beta$ 316	41 H. 511	31 419
$\eta$ 499	$\eta$ 403	$\gamma$ 430	$\omega$ 383	$\gamma$ 323	43 H. 232	43 421
$\theta$ 497	$\theta$ 403	$\delta$ 437	$d^1$ 386	$\delta$ 326	47 H. 341	
$\iota$ 495	$\iota$ 393	$\epsilon$ 432	83 393	$\epsilon$ 330	48 H. 343	
$\lambda$ 502	$\lambda$ 392	$\eta$ 425		$\zeta$ 319	51 H. 233	Cor. Austr.
$\mu$ 485	$\mu$ 404	$\theta$ 429	Can. Maj.	$\eta$ 322	226 B. 499	$\alpha$ 470
$\nu$ 487	$\nu$ 373	$\lambda$ 428	$\alpha$ 374	$\iota$ 335		
$\xi$ 491	$\xi$ 382	$\mu$ 437	$\beta$ 370	$\mu$ 324	Ceti.	Cor. Bor.
$\pi$ 498	$\pi$ 378	$\nu^1$ 439	$\gamma$ 377	$o$ 321	$\alpha$ 341	$\alpha$ 439
$\sigma$ 498	$\rho$ 384	$\rho$ 430	$\delta$ 377	$\rho$ 512	$\beta$ 321	$\beta$ 438
$\tau$ 501	$\sigma$ 380	$\sigma$ 431	$\epsilon$ 376	$\omega$ 328	$\gamma$ 338	$\epsilon$ 443
$v$ 499	$\tau$ 375	$\tau$ 424	$\zeta$ 369	4 507	$\delta$ 337	$\zeta$ 440
$\varphi$ 505	$v$ 396	$\psi$ 435	$\eta$ 379	5 H <sup>1</sup> . 505	$\zeta$ 330	$\sigma$ 445
$\psi$ 505	$\varphi$ 398	$c$ 435	$\theta$ 376	21 321	$\eta$ 324	
$\omega^2$ 510	$\chi$ 383	$d$ 427				

# INDEX TO APPARENT PLACES OF STARS, 1917. 789

Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.
Corvi.	Doradus.	Eridani.	Groombr.	Horologii.	Leonis.	Lupi.
$\beta$ 417	$\alpha$ 355	$\nu$ 354	1446 388	$\alpha$ 352	$\varepsilon$ 396	$\beta$ 434
$\gamma$ 414	$\delta$ 366	$\sigma^1$ 352	1450 387	$\mu$ 342	$\zeta$ 400	$\gamma$ 439
$\delta$ 416		$\tau^2$ 340	1586 397	38 G. 344	$\eta$ 398	$\zeta$ 436
$\varepsilon$ 413	Draconis.	$\tau^3$ 341	1706 405		$\theta$ 408	
		$\tau^5$ 347	1830 412	Hydræ.	$\iota$ 409	Lyncis.
Crateris.	$\alpha$ 427	$\tau^6$ 348	2001 423		$\mu$ 397	
	$\beta$ 456	$\nu^5$ 353	2164 433	$\alpha$ 394	$\xi$ 395	2 369
$\alpha$ 406	$\gamma$ 460	$\varphi$ 334	2283 236	$\gamma$ 422	$\sigma$ 396	8 371
$\beta$ 407	$\delta$ 471	$\varepsilon$ 345	2320 444	$\delta$ 388	$\pi$ 398	15 375
$\delta$ 408	$\varepsilon$ 476	$g$ 348	2377 450	$\varepsilon$ 390	$\rho$ 402	24 381
$\zeta$ 411	$\zeta$ 453	12 343	2533 463	$\zeta$ 390	$\sigma$ 409	26 383
	$\eta$ 447	53 355	3241 481	$\theta$ 392	$\tau$ 409	27 384
Crucis.	$\theta$ 443		4163 512	$\lambda$ 399	$\nu$ 410	31 386
	$\iota$ 438	Fornacis.		$\mu$ 401	$\chi$ 407	40 393
$\alpha^1$ 415	$\kappa$ 417			$\nu$ 404	$d$ 406	
$\beta$ 419	$\lambda$ 410	$\beta$ 339	Gruis.	$\xi$ 410	$l$ 404	Lyræ.
$\gamma$ 416	$\xi$ 459	$\kappa$ 335	$\alpha$ 495	$\pi$ 426	$p^4$ 407	
$\delta$ 414	$\sigma$ 468	$\mu$ 334	$\beta$ 500	$\sigma$ 388	54 405	$\alpha$ 466
	$\tau$ 472		$\gamma$ 493			$\beta$ 467
	$\chi$ 464	Geminor.	$\varepsilon$ 501	Hydri.	Leo. Min.	$\gamma$ 469
Cygni.	$\psi$ 458		$\iota$ 504			$\theta$ 471
	$\omega$ 457	$\alpha^2$ 380		$\alpha$ 332	10 395	$\iota$ 470
$\alpha$ 483	$A$ 448	$\beta$ 382		$\beta$ 318	19 398	R 468
$\beta$ 473	1 H. 234	$\gamma$ 372	Herculis.	$\gamma$ 349	31 401	
$\gamma$ 480	3 411	$\delta$ 378		$\delta$ 335	41 403	
$\delta$ 475	4 H. 414	$\varepsilon$ 373	$\alpha$ 453	$\varepsilon$ 337	42 403	Mensæ.
$\varepsilon$ 484	9 H. 402	$\zeta$ 376	$\beta$ 448	$\theta$ 342	46 405	
$\zeta$ 488	12 H. 441	$\eta$ 369	$\gamma$ 446	$\iota$ 345		$\delta$ 353
$\theta$ 474	35 459	$\theta$ 375	$\delta$ 453	$\lambda$ 322	Leporis.	$\zeta$ 233
$\iota$ 473	36 463	$\iota$ 379	$\varepsilon$ 452	$\mu$ 337		31 G. 233
$\kappa$ 472	50 467	$\kappa$ 381	$\zeta$ 450		$\alpha$ 363	
$\nu$ 486	76 237	$\lambda$ 378	$\eta$ 450	Indi.	$\beta$ 362	Microscop.
$\xi$ 487	79 494	$\mu$ 370	$\theta$ 460		$\delta$ 366	
$\sigma$ 489	220 H <sup>1</sup> . 485	$\nu$ 371	$\iota$ 457	$\alpha$ 482	$\varepsilon$ 359	$\gamma$ 486
$\tau$ 488		$\xi$ 373	$\kappa$ 444	$\beta$ 485	$\zeta$ 365	$\theta^1$ 489
$g$ 490	Equulei.	$\rho$ 380	$\lambda$ 456	$\varepsilon$ 494	$\eta$ 367	
15 475		$\varphi$ 382	$\mu$ 458	$\rho$ 502	$\mu$ 360	Monocer.
41 481		$\chi$ 384	$\xi$ 460			
61 487	Eridani.	1 368	$\sigma$ 454	Lacertæ.	Libræ.	S 373
74 491		51 377	$\tau$ 446			8 370
	$\alpha$ 328		$\varphi$ 444	$\alpha$ 498	$\alpha$ 433	10 371
	$\beta$ 359	Groombr.	$\omega$ 447	3 498	$\beta$ 437	18 374
Delphini.	$\gamma$ 350	750 232	$d$ 452	10 499	$\gamma$ 439	25 381
	$\delta$ 347	848 355	$w$ 454	Leonis.	$\delta$ 434	30 387
$\alpha$ 482	$\varepsilon$ 346	944 232	49 451		$\iota$ 436	
$\beta$ 482	$\zeta$ 344	966 363	89 459	$\alpha$ 399	$\lambda$ 442	
$\gamma$ 484	$\eta$ 340	1119 234	109 464	$\beta$ 412	$\xi^2$ 434	Muscæ.
$\delta$ 483	$\theta$ 341	1308 379	110 466	$\gamma$ 400	2 429	
$\varepsilon$ 481	$\mu$ 356	1374 383		$\delta$ 408	8 433	$\alpha$ 417
					32 438	$\delta$ 420

# 740 INDEX TO APPARENT PLACES OF STARS, 1917.

Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.	Name. Page.
Normæ.	Orionis.	Persei.	Puppis.	Scorpii.	Telescopii.	Urs. Min.
$\gamma^2$ 445	$\pi^s$ 357	$\rho$ 342	1 G. 368	$\tau$ 449	$\alpha$ 464	$\alpha$ 232
	$\tau$ 361	$\tau$ 340	4 382	24 449		$\beta$ 433
Octantis.	$\phi^1$ 364	$v$ 328	20 385		Trianguli.	$\gamma$ 437
$\alpha$ 486	11 359	$\phi$ 329		Sculptoris.		$\delta$ 237
$\beta$ 238		$c$ 351	Pyxidis.	$\alpha$ 323	$\alpha$ 330	$\epsilon$ 236
$\gamma^1$ 238	Pavonis.	$m$ 354	$\alpha$ 389	$\beta$ 508	$\beta$ 333	$\zeta$ 441
$\delta$ 236	$\alpha$ 480	6 333	$\theta$ 394	$\gamma$ 506	$\gamma$ 334	$\eta$ 447
$\zeta$ 234	$\beta$ 483			$\delta$ 511		$\lambda$ 237
$\eta$ 235	$\gamma$ 490	Phœnicis.	Reticuli.	$\epsilon$ 330	Tri. Austr.	4 428
$\iota$ 235	$\epsilon$ 477	$\alpha$ 318	$\alpha$ 352		$\alpha$ 450	5 430
$\kappa$ 235	$\zeta$ 465	$\beta$ 324	$\delta$ 350	Serpentis.	$\beta$ 442	19 445
$\lambda$ 238	$\eta$ 457	$\gamma$ 326		$\alpha$ 440	$\gamma$ 436	Velorum.
$\rho$ 236	$\lambda$ 467	$\epsilon$ 316	Sagittæ.	$\beta$ 440		$q$ 399
$\sigma$ 237	Pegasi.	$\mu$ 320	$\beta$ 474	$\gamma$ 442	Tucanæ.	
$v$ 238	$\alpha$ 503	$\psi$ 331	$\gamma$ 477	$\epsilon$ 441	$\alpha$ 497	Virginis.
$\chi$ 237	$\beta$ 503	Piazz.	$\delta$ 476	$\eta$ 463	$\gamma$ 506	$\alpha$ 422
4 G. 232	$\gamma$ 317	221 434		$\theta$ 468	$\epsilon$ 513	$\beta$ 412
7 G. 233	$\epsilon$ 492		Sagittarii.	$\kappa$ 440	$\zeta$ 318	$\gamma$ 418
Ophiuchi.	$\zeta$ 500	Pictoris.	$\gamma$ 461	$\mu$ 441	$\kappa$ 325	$\delta$ 420
$\alpha$ 456	$\eta$ 500	$\alpha$ 375	$\delta$ 463	$\xi$ 457		$\epsilon$ 421
$\beta$ 458	$\theta$ 496		$\epsilon$ 464	$\tau^1$ 438	Urs. Maj.	$\zeta$ 423
$\gamma$ 459	$\iota$ 495	Pisc. Austr.	$\zeta$ 469	$c$ 465	$\alpha$ 406	$\eta$ 415
$\delta$ 445	$\lambda$ 501	$\alpha$ 503	$\eta$ 462	3 436	$\beta$ 406	$\theta$ 421
$\epsilon$ 446	$\mu$ 501	$\epsilon$ 500	$\iota$ 477		$\gamma$ 412	$\iota$ 428
$\zeta$ 449	$\pi$ 496	3 488	$\lambda$ 465	Sextantis.	$\delta$ 414	$\kappa$ 427
$\eta$ 452	$\tau$ 507		$\mu$ 462	6 397	$\epsilon$ 420	$\lambda$ 429
$\theta$ 454	$v$ 507	Piscium.	$\pi$ 470	33 402	$\zeta^1$ 422	$\mu$ 432
$\kappa$ 451	$\phi$ 511	$\gamma$ 506	$\sigma$ 468	Tauri.	$\eta$ 424	$\nu$ 413
$\lambda$ 448	1 490	$\delta$ 322	$\phi$ 466	$\alpha$ 354	$\theta$ 395	$\pi$ 413
$\nu$ 460	16 493	$\epsilon$ 323	$\psi$ 471	$\beta$ 362	$\iota$ 391	$\rho$ 418
$\sigma$ 455	20 494	$\zeta$ 325	$c$ 478	$\gamma$ 353	$\kappa$ 391	$\tau$ 426
$\delta$ 455	31 497	$\eta$ 327	$d$ 471	$\delta$ 353	$\lambda$ 400	$\phi$ 430
30 452	55 504	$\theta$ 508	$f$ 475	$\epsilon$ 354	$\mu$ 400	$\chi$ 418
67 461	59 505	$\iota$ 509	$h$ 473	$\zeta$ 364	$\nu$ 408	$m$ 424
70 461	70 508	$\kappa$ 508	54 474	$\eta$ 348	$\sigma$ 387	70 423
72 462	72 509	$\nu$ 329	Scorpii.	$\iota$ 358	$\sigma^2$ 392	89 425
		$\xi$ 331	$\alpha$ 448	$\lambda$ 350	$v$ 397	109 432
Orionis.	Persei.	$\circ$ 329	$\beta$ 443	$\mu$ 352	$\psi$ 407	Volantis.
$\alpha$ 367	$\alpha$ 345	$\pi$ 328	$\gamma$ 435	$\nu$ 351	$\chi$ 411	$\gamma^2$ 378
$\beta$ 360	$\beta$ 343	$\tau$ 325	$\delta$ 443	$\xi$ 346	$d$ 394	$\delta$ 379
$\gamma$ 362	$\gamma$ 342	$v$ 326	$\epsilon$ 451	$\circ$ 345	$h$ 394	
$\delta$ 363	$\delta$ 347	$\omega$ 512	$\eta$ 453	$\tau$ 355	3 H. 384	
$\epsilon$ 364	$\epsilon$ 349	$f$ 325	$\iota^1$ 458	$\Delta$ 351	30 H. 401	Vulpeculæ.
$\zeta$ 365	$\zeta$ 349	30 513	$\lambda$ 456	$f$ 346	32 399	24 479
$\iota$ 364	$\eta$ 339	33 316	$\pi$ 442	$i$ 357	36 402	32 485
$\kappa$ 366	$\theta$ 338	44 318	$\sigma$ 446	$p$ 351	76 419	
$\nu$ 368	$\nu$ 347					
$\pi^s$ 356	$\xi$ 350					

# GENERAL INDEX.

	Page.
Abbreviations . . . . .	xx
Aberration, Constant of . . . . .	xviii
of the Sun . . . . .	3
Achernar (Alpha Eridani), Apparent Place . . . . .	328
Mean Place . . . . .	217
Age of the Moon . . . . .	118
Alcyone (Eta Tauri), Apparent Place . . . . .	348
Mean Place . . . . .	219
Aldebaran (Alpha Tauri), Apparent Place . . . . .	354
Mean Place . . . . .	219
Algol (Beta Persei), Apparent Place . . . . .	343
Mean Place . . . . .	218
Alioth (Epsilon Urse Majoris), Apparent Place . . . . .	420
Mean Place . . . . .	224
Alkaid (Eta Urse Majoris), Apparent Place . . . . .	424
Mean Place . . . . .	224
Alpha Canis Majoris (Sirius), Apparent Place . . . . .	374
Mean Place . . . . .	221
Orbit Position . . . . .	xii
Parallax . . . . .	xi
Alpha Canis Minoris (Procyon), Apparent Place . . . . .	381
Mean Place . . . . .	221
Orbit Position . . . . .	xii
Parallax . . . . .	xi
Alpha Centauri, Apparent Place . . . . .	481
Mean Place . . . . .	225
Orbit Position . . . . .	xii
Parallax . . . . .	xi
Alpha Urse Minoris (Polaris), Apparent Place . . . . .	232, 709
Mean Place . . . . .	231
Polaris Tables . . . . .	685
Alpheratz (Alpha Andromedæ), Apparent Place . . . . .	316
Mean Place . . . . .	217
Altair (Alpha Aquilæ), Apparent Place . . . . .	476
Mean Place . . . . .	228
Parallax . . . . .	xi
Anniversaries and Festivals . . . . .	xvi
Antares (Alpha Scorpii), Apparent Place . . . . .	448
Mean Place . . . . .	226
Aphelia of Planets . . . . .	672
Apogee of Moon . . . . .	117
Apparent Place of 2 Aquilæ, Example of Reduction to . . . . .	718
Places of 790 Standard Stars . . . . .	316
of 35 Circumpolar Stars . . . . .	232
of 825 Stars, Index to . . . . .	738
Arcturus (Alpha Boötis), Apparent Place . . . . .	428
Mean Place . . . . .	224
Ariel, First Satellite of Uranus . . . . .	688, 689, 670



	Page.
Arrangement and Use of the American Ephemeris . . . . .	711
Aspects of the Planets . . . . .	672
Astronomical Constants . . . . .	xviii
Azimuth of Polaris at all Hour Angles, Table IV . . . . .	696
at Elongation, Table V . . . . .	702
Beginning of the Seasons . . . . .	672
Bellatrix (Gamma Orionis), Apparent Place . . . . .	362
Mean Place . . . . .	220
Besselian Elements of Solar Eclipses . . . . .	560, 561, 562, 563
Formulae for Star Reductions . . . . .	200
Star Numbers . . . . .	202, 214
Example of Reduction with . . . . .	718
Exclusive of short-period Terms . . . . .	214
Betelgeux (Alpha Orionis), Apparent Place . . . . .	367
Mean Place . . . . .	220
Brilliance of the Planets, greatest (see Stellar Magnitude under each planet).	
Canopus (Alpha Argus), Apparent Place . . . . .	371
Mean Place . . . . .	220
Capella (Alpha Aurigæ), Apparent Place . . . . .	361
Mean Place . . . . .	220
Castor (Alpha Geminorum), Apparent Place . . . . .	380
Mean Place . . . . .	221
Charts of Solar Eclipses . . . . .	following pages 560, 562
Chronological Eras and Cycles . . . . .	xvii
Circumpolar Stars, Apparent Places . . . . .	232
Mean Places . . . . .	231
Conjunctions of Planets . . . . .	672
of Satellites . . . . .	633
Constants, Astronomical . . . . .	xviii
Culminations, Moon . . . . .	522
of Polaris, Table VI for finding times of . . . . .	708
Upper Culmination, Meridian of Greenwich, Table VII . . . . .	709
Cygni 61, Apparent Place . . . . .	487
Mean Place . . . . .	229
Parallax . . . . .	xi
Day, Civil and Astronomical . . . . .	712
Length of . . . . .	xviii
of Julian Period . . . . .	xvii
Delta Cassiopeiæ, Apparent Place . . . . .	326
Mean Place . . . . .	217
Used for finding time of culmination of Polaris (Table VI) . . . . .	708
Deneb (Alpha Cygni), Apparent Place . . . . .	483
Mean Place . . . . .	228
Denebola (Beta Leonis), Apparent Place . . . . .	412
Mean Place . . . . .	223
Dione, Fourth Satellite of Saturn . . . . .	659, 662, 664, 666
Disk of Mercury . . . . .	624
of Venus . . . . .	625
Distance, Astronomical Unit of . . . . .	xviii
of the Moon . . . . .	xviii
of the Planets (see also reference under each planet) . . . . .	xix
of the Sun . . . . .	xviii, 3
Dominical Letter . . . . .	xvii
Earth, Dimensions of . . . . .	xviii
Elements of Orbit of . . . . .	xix
Earth's Radius Vector, Logarithm of . . . . .	3
Easter, Date of . . . . .	xvi

	Page.
Eccentricities of the Orbits of the Earth and Planets . . . . .	xix
Eclipses, Solar and Lunar, Elements and Circumstances of . . . . .	556
Solar, Besselian Elements of . . . . .	560, 561, 562, 563
Charts of . . . . .	following pages 560, 562
Correction to Elements of . . . . .	xii
Example of the Computation of . . . . .	726
Ecliptic, Obliquity of . . . . .	3
Election Day, Date of . . . . .	xvi
Elements of Planetary Orbits . . . . .	xix
Elongations of Planets . . . . .	672
of Satellites . . . . .	633, 660, 668, 671
Elongation, Azimuth of Polaris at, Table V . . . . .	702
of Polaris, Time Interval from Upper Culmination, Table VII . . . . .	709
Enceladus, Second Satellite of Saturn . . . . .	659, 661, 664, 666
Epect . . . . .	xvii
Ephemeris for the Meridian of Greenwich (Part I) . . . . .	1-198
of Washington (Part II) . . . . .	199-554
Equation of Time for Greenwich Mean Noon . . . . .	2
for Washington Apparent Noon . . . . .	514
Equator, Moon's . . . . .	615
Equinoxes, Date of . . . . .	672
Errata . . . . .	viii
Example of the Computation of Lunar Distances . . . . .	684
of Occultations . . . . .	732
of Solar Eclipses . . . . .	726
Reduction of Stars to Apparent Place . . . . .	718
of the Sun . . . . .	714
Festivals, etc . . . . .	xvi
Fomalhaut (Alpha Piscis Australis), Apparent Place . . . . .	508
Mean Place . . . . .	230
Geocentric Ephemerides of the Planets . . . . .	134
Latitude of Observatories, Reduction to . . . . .	674
Golden Number . . . . .	xvii
Gravity, Acceleration due to . . . . .	xviii
Gaussian Constant of . . . . .	xviii
Greenwich Ephemeris (Part I) . . . . .	1-198
Hayford's Spheroid . . . . .	xviii
Heliocentric Coordinates of the Planets . . . . .	142
Hyperion, Seventh Satellite of Saturn . . . . .	659, 662, 665, 667
Iapetus, Eighth Satellite of Saturn . . . . .	659, 662, 665, 667
Independent Star-Numbers . . . . .	206, 214
Example of Reduction with . . . . .	719
Exclusive of short-period Terms . . . . .	214
Formulæ for . . . . .	200
Irradiation . . . . .	xiii
Julian Period . . . . .	xvii
Jupiter, Diameter, Apparent Equatorial . . . . .	629
Distance from Earth, logarithm of . . . . .	174
Elements of Orbit of . . . . .	xix
Ephemeris for Physical Observations of . . . . .	628
Elements used . . . . .	xiv
Greenwich, Transit of . . . . .	174
Heliocentric Longitude and Latitude of . . . . .	182
Horizontal Parallax of . . . . .	174, 547
Radius Vector (Distance from Sun), logarithm of . . . . .	182
Reduction to Orbit . . . . .	182
Right Ascension and Declination at Greenwich Mean Noon . . . . .	174
at Washington Transit . . . . .	547

	Page.
Jupiter, Satellites, Diagram of Apparent Orbits of . . . . .	632
Synodic Periods of . . . . .	632
I, II, III, and IV, Phenomena and Configurations of . . . . .	636
Times of Superior Conjunction of . . . . .	633
Satellite V, Greatest Elongation of . . . . .	633
Satellites VI and VII, Differential Coordinates of . . . . .	635
Semidiameter, Adopted Constant of . . . . .	xix
Polar . . . . .	174, 547
Sidereal Time of, Passing Meridian . . . . .	547
Stellar Magnitude of . . . . .	547, 628
Washington Transit of . . . . .	547
Latitude, for finding, by an Observed Altitude of Polaris, Tables I, Ia . . . . .	685
Formula for Reduction to Geocentric . . . . .	xviii
Heliocentric, of the Planets . . . . .	142
of the Moon . . . . .	118
Corrections to . . . . .	xii
of the Sun . . . . .	3
Length of the Day . . . . .	xviii
of the Month . . . . .	xviii
of the Seconds Pendulum . . . . .	xviii
of the Year . . . . .	xviii
Libration of the Moon . . . . .	616
Light, Velocity of . . . . .	xviii
Longitude, Heliocentric, of the Planets . . . . .	142
Mean, of the Moon . . . . .	615
Nutation in . . . . .	3
of the Sun . . . . .	3
of the Moon, Corrections to . . . . .	xii
Precession in . . . . .	3
Short Period Terms of Nutation in . . . . .	215
True, of the Moon . . . . .	118
Lunar Distances, Examples in . . . . .	684
Magnitudes, Stellar, of Jupiter . . . . .	547, 628
of Mars . . . . .	548, 628
of Mercury . . . . .	624
of Neptune . . . . .	543
of Saturn . . . . .	549, 624
of Uranus . . . . .	551
of Venus . . . . .	625
Maps of Solar Eclipses . . . . .	following pages 580, 582
Markab (Alpha Pegasi), Apparent Place . . . . .	588
Mean Place . . . . .	230
Mars, Distance from Earth, logarithm of . . . . .	162
Elements of Orbit of . . . . .	xix
Ephemeris for Physical Observations of . . . . .	626
Elements used . . . . .	xiv
Greenwich Transit of . . . . .	162
Heliocentric Longitude and Latitude of . . . . .	170
Horizontal Parallax of . . . . .	162, 546
Occultation of . . . . .	594
Radius Vector (Distance from Sun), logarithm of . . . . .	170
Reduction to Orbit . . . . .	170
Right Ascension and Declination at Greenwich Mean Noon . . . . .	162
at Washington Transit . . . . .	546
Semidiameter, Adopted Constant of . . . . .	xix
Apparent . . . . .	162, 546
Sidereal Time of, Passing Meridian . . . . .	546
Stellar Magnitude of . . . . .	546, 626

	Page.
rs, Washington Transit of . . . . .	546
se of Planets . . . . .	xix
an Places of 790 Standard Stars . . . . .	217
of 35 Circumpolars . . . . .	231
of Stars Occulted by the Moon . . . . .	564
an Solar into Sidereal Time, Table III . . . . .	693
cury, Apparent Disk of . . . . .	624
Distance from Earth, logarithm of . . . . .	134
Elements of Orbit of . . . . .	xix
Greenwich Transit of . . . . .	134
Heliocentric Longitude and Latitude of . . . . .	142
Horizontal Parallax of . . . . .	134, 538
Radius Vector (Distance from Sun), logarithm of . . . . .	142
Reduction to Orbit . . . . .	142
Right Ascension and Declination at Greenwich Mean Noon . . . . .	134
at Washington Transit . . . . .	538
Semidiameter, Adopted Constant of . . . . .	xix
Apparent . . . . .	134, 538
Sidereal Time of, Passing Meridian . . . . .	538
Stellar Magnitude of . . . . .	624
Washington Transit of . . . . .	538
idian Passage of Jupiter . . . . .	174, 547
of Mars . . . . .	162, 546
of Mercury . . . . .	134, 538
of Moon . . . . .	118, 522
of Neptune . . . . .	197, 553
of Saturn . . . . .	184, 549
of Sun . . . . .	514
of Uranus . . . . .	193, 551
of Venus . . . . .	150, 542
nas, First Satellite of Saturn . . . . .	659, 660, 664, 696
a (Omicron Ceti), Apparent Place . . . . .	335
Mean Place . . . . .	218
ar (Zeta Ursæ Majoris), Apparent Place . . . . .	422
Mean Place . . . . .	224
Used for finding time of Culmination of Polaris (Table VI) . . . . .	708
nth, Length of . . . . .	xviii
on, Age of, Greenwich Mean Noon and Midnight . . . . .	118
Apogee and Perigee . . . . .	117
Bright Limbs . . . . .	522
Corrections to the Long., Lat., and Hor. Parallax of the . . . . .	xii
Culminations, upper and lower, Meridian of Washington . . . . .	522
Distance from Earth, Mean . . . . .	xviii
Eclipses of, Elements and Circumstances . . . . .	556
Ephemeris for Physical Observations of . . . . .	616
Formula used . . . . .	xiii
Hourly . . . . .	26
Equator, Position of . . . . .	615
Libration, Formulae for computing . . . . .	xiv
Longitude and Latitude of . . . . .	118
Formulae for . . . . .	ix
Longitude, Mean . . . . .	615
True . . . . .	118
Motion of, in Mean Longitude . . . . .	615
Node, Mean Longitude of . . . . .	615
Parallax for Greenwich Noon and Midnight . . . . .	118
for Washington, upper and lower transit . . . . .	522
Mean Equatorial Horizontal . . . . .	xviii

	Page
Moon, Perigee and Apogee . . . . .	117
Perigee, Mean Longitude of . . . . .	615
Phases of . . . . .	117
Right Ascension and Declination for each Hour . . . . .	26
for Washington upper and lower Transit . . . . .	522
Semidiameter, Adopted Constant of . . . . .	xiii, xix
Apparent . . . . .	118, 522
Sidereal Time of, Passing Meridian . . . . .	522
Transit, upper and lower, at Greenwich . . . . .	118
at Washington . . . . .	522
Neptune, Distance from Earth, logarithm of . . . . .	196
Elements of Orbit of . . . . .	xix
Greenwich Transit of . . . . .	196
Heliocentric Longitude and Latitude of . . . . .	196
Horizontal Parallax of . . . . .	196, 553
Occultation of . . . . .	570, 573, 576
Radius Vector (Distance from Sun), logarithm of . . . . .	196
Reduction to Orbit . . . . .	196
Right Ascension and Declination at Greenwich Mean Noon . . . . .	196
at Washington Transit . . . . .	553
Satellite, Apparent Apisides of . . . . .	671
Diagram of Apparent Orbit of . . . . .	671
Sidereal Period of . . . . .	671
Tables for Determining Position Angle and Distance of . . . . .	670
Times of Elongation of . . . . .	671
Semidiameter, Adopted Constant of . . . . .	xix
Apparent . . . . .	196, 553
Sidereal Time of, Passing Meridian . . . . .	553
Stellar Magnitude of . . . . .	553
Washington Transit of . . . . .	553
Node, Mean Longitude of the Moon's . . . . .	615
Nutation, Constant of . . . . .	xviii
Formulae for . . . . .	x
Terms of Short Period in the . . . . .	215
in Longitude . . . . .	3
Oberon, Fourth Satellite of Uranus . . . . .	668, 669, 670
Obliquity of the Ecliptic, True . . . . .	3
Mean . . . . .	xviii
Short Period Terms of Nutation in . . . . .	215
Observatories, Positions of, etc. . . . .	674
Occultations, Elements for Prediction of . . . . .	569
Example of Computation of . . . . .	732
Mean Places of Stars . . . . .	564
of Planets . . . . .	570, 573, 576, 579, 594, 602
Visible at Washington . . . . .	611
Opposition of Planets . . . . .	672
Orbits of the Planets, Elements of . . . . .	xix
Orbit Positions of Sirius, Procyon, and $\alpha^2$ Centauri . . . . .	xii
Parallax, Annual of $\tau$ Ceti, $\epsilon$ Eridani, Sirius, Procyon, $\alpha$ Centauri, Altair, and $\delta$ Cygni . . . . .	xi
Corrections to, of the Moon . . . . .	xii
Horizontal, of Jupiter . . . . .	174, 547
of Mars . . . . .	162, 546
of Mercury . . . . .	134, 538
of Moon . . . . .	xviii, 118, 522
of Neptune . . . . .	196, 553
of Saturn . . . . .	184, 549
of Sun . . . . .	2

	Page.
Parallax, Horizontal, of Uranus . . . . .	193, 551
of Venus . . . . .	150, 542
Solar, Constant of . . . . .	ix, xviii
Pendulum, Length of Seconds . . . . .	xviii
Perigee of the Moon . . . . .	117
Longitude of Moon's . . . . .	615
Perihelia of Planets . . . . .	xix, 672
Phases of Eclipses of Jupiter's Satellites . . . . .	637
of the Moon . . . . .	117
Phenomena, Eclipses, Occultations, Satellites, etc., Part III . . . . .	555
of Jupiter's Satellites . . . . .	636
Planetary Configurations . . . . .	672
Phoebe, Ninth Satellite of Saturn . . . . .	659, 663
Physical Observations of Jupiter, Ephemeris for . . . . .	628
of Mars, Ephemeris for . . . . .	626
of the Moon, Ephemeris for . . . . .	616
of the Sun, Ephemeris for . . . . .	614
Planetary Configurations . . . . .	672
Orbits, Elements of . . . . .	xix
Planets, Aspects of . . . . .	672
at Greatest Brilliancy (see Stellar Magnitude under each planet) . . . . .	
at Stationary Points . . . . .	672
in Ascending and Descending Node . . . . .	672
in Conjunction . . . . .	672
in Elongation . . . . .	672
in Opposition . . . . .	672
in Perihelion and Aphelion . . . . .	672
in Quadrature . . . . .	672
Occultations of . . . . .	570, 573, 576, 579, 594, 602
Semidiameters of . . . . .	xix
Signs of . . . . .	xx
Polaris (Alpha Ursæ Minoris), Apparent Place . . . . .	232, 709
Azimuth of, at All Hour Angles, Table IV . . . . .	696
Azimuth of, at Elongation, Table V . . . . .	702
for Finding the Times of Upper and Lower Culminations from Observations in Connection with Zeta Ursæ Majoris (Mizar), S. P. and Delta Cassiopeiæ, S. P., Table VI . . . . .	708
Mean Place . . . . .	231
Table I, for Determining Latitude by Observations of Polaris . . . . .	685
Time of Upper Culmination, and Time Interval between Upper Culmination and Elongation, Table VII . . . . .	709
Pole Star (see Polaris).	
Pollux (Beta Geminorum), Apparent Place . . . . .	382
Mean Place . . . . .	221
Precession, General . . . . .	xviii
in Longitude . . . . .	3
Procyon (Alpha Canis Minoris), Apparent Place . . . . .	381
Mean Place . . . . .	221
Orbit Position . . . . .	xii
Parallax . . . . .	xi
Quadrature of Planets . . . . .	672
Radius Vector of the Earth, logarithm of . . . . .	3
of the Planets, logarithm of . . . . .	142
Reduction of Sidereal to Solar Time, and <i>vice versa</i> , Tables II, III . . . . .	690
of Stars to Apparent Place, Formulæ for . . . . .	200
Example of . . . . .	718

	Page
<b>Regulus (Alpha Leonis), Apparent Place</b>	399
Mean Place	222
<b>Rhea, Fifth Satellite of Saturn</b>	659, 662, 665, 667
<b>Rigel (Beta Orionis), Apparent Place</b>	360
Mean Place	239
<b>Rings of Saturn</b>	658
<b>Roman Indiction</b>	xvii
<b>Satellites of Jupiter</b>	632
of Neptune	670
of Saturn	659
of Uranus	668
<b>Saturn, Distance from Earth, logarithm of</b>	184
Elements of Orbit of	xix
Greenwich Transit of	184
Heliocentric Longitude and Latitude of	192
Horizontal Parallax of	184, 549
Occultation of	570, 573, 576, 579
Radius Vector (Distance from Sun), logarithm of	192
Reduction to Orbit	192
Right Ascension and Declination at Greenwich Mean Noon	184
at Washington Transit	549
Rings, Elements for Determining Geocentric Position of	658
Satellites, Diagram of Apparent Orbits of	659
Differential Coordinates of Phoebe	663
Greatest Elongations of	660
Names of	659
Synodic Periods of	659
Tables for Determining Position Angle and Distance	664
Semidiameter, Adopted Constant of	xix
Apparent Polar	184, 549
Sidereal Time of, Passing Meridian	549
Stellar Magnitude of	549, 698
Washington Transit of	549
<b>Schedir (Alpha Cassiopeæ), Apparent Place</b>	320
Mean Place	217
<b>Seasons, Beginning of</b>	672
<b>Semidiameter of Jupiter</b>	174, 547
of Mars	162, 546
of Mercury	134, 538
of Moon	118, 522
of Neptune	196, 553
of Saturn	184, 549
of Sun	2, 514
of Uranus	183, 551
of Venus	150, 542
<b>Semidiameters of the Sun and Moon, Adopted Constants of</b>	xiii, xix
of the Planets, Adopted Constants of	xix
<b>Short Period Terms of Nutation</b>	215
in Star Numbers	200
<b>Sidereal into Mean Solar Time, Table II</b>	690
Noon, Greenwich Mean Time of	3
Time of Washington Mean Noon	514
or Right Ascension of Mean Sun	2
<b>Signs of the Zodiac</b>	xx
<b>Sirius (Alpha Canis Majoris), Apparent Place</b>	374
Mean Place	221
Orbit Position	xii
Parallax	xi

	Page.
<b>Solar Cycle</b> . . . . .	xvii
<b>Ephemeris</b> . . . . .	2, 514
<b>into Sidereal Time, Table III</b> . . . . .	693
<b>Solstices</b> . . . . .	672
<b>Spheroid, Hayford's</b> . . . . .	xviii
<b>Spica (Alpha Virginis), Apparent Place</b> . . . . .	422
<b>Mean Place</b> . . . . .	224
<b>Stars, Apparent Places of 790 Standard</b> . . . . .	316
<b>of 35 Circumpolar</b> . . . . .	232
<b>Elements of Occultations</b> . . . . .	569
<b>Example of Reduction to Apparent Position</b> . . . . .	718
<b>Formulae for Reduction to Apparent Position</b> . . . . .	xi, 200
<b>Index to the Apparent Places</b> . . . . .	738
<b>Mean Places for Beginning of the Year, of 790 Standard</b> . . . . .	217
<b>of 35 Circumpolar</b> . . . . .	231
<b>of Stars Occulted by the Moon</b> . . . . .	564
<b>Occultations visible at Washington</b> . . . . .	611
<b>Star Numbers, Besselian and Independent, omitting short-period terms</b> . . . . .	214
<b>Besselian, including short-period terms</b> . . . . .	202
<b>Formulae used in Computing</b> . . . . .	x, 200
<b>Independent, including short-period terms</b> . . . . .	206
<b>Sun, Aberration of</b> . . . . .	3
<b>Constant of</b> . . . . .	xviii
<b>Coordinates, rectangular</b> . . . . .	18
<b>Formulae for</b> . . . . .	ix
<b>Distance from Earth, Mean</b> . . . . .	xviii
<b>Distance from Earth at Gr. Mean Noon, logarithm of</b> . . . . .	3
<b>Eclipses of, Charts</b> . . . . .	following pages 560, 562
<b>Elements and Circumstances of</b> . . . . .	556, 672
<b>Example of Computation of</b> . . . . .	726
<b>Ephemeris for Physical Observations of</b> . . . . .	614
<b>Formulae used</b> . . . . .	xiii
<b>Examples in the Reduction of</b> . . . . .	714
<b>Longitude and Latitude, Greenwich Mean Noon</b> . . . . .	3
<b>Mean, R. A. of, at Greenwich Mean Noon</b> . . . . .	2
<b>Parallax, Constant of</b> . . . . .	ix, xviii
<b>Horizontal</b> . . . . .	2
<b>R. A. and Decl. at Greenwich Mean Noon</b> . . . . .	2
<b>at Washington Apparent Noon</b> . . . . .	514
<b>Semidiameter, Adopted Constant of</b> . . . . .	xiii, xix
<b>Apparent</b> . . . . .	2, 514
<b>Sidereal Time of, Passing Meridian</b> . . . . .	514
<b>Symbols and Abbreviations</b> . . . . .	xx
<b>Synodic Month, Length of</b> . . . . .	xviii
<b>Periods of the Planets</b> . . . . .	xix
<b>Satellites</b> . . . . .	632, 659
<b>Terms of Short Period in the Nutation</b> . . . . .	215
<b>Tethys, Third Satellite of Saturn</b> . . . . .	639, 661, 664, 666
<b>Thanksgiving Day, Date of</b> . . . . .	xvi
<b>Time, Equation of, at Greenwich Mean Noon</b> . . . . .	2
<b>at Washington Apparent Noon</b> . . . . .	514
<b>Mean, of Greenwich Sidereal Noon</b> . . . . .	3
<b>Precepts for Conversion of</b> . . . . .	712
<b>Sidereal, of Greenwich Mean Noon</b> . . . . .	2
<b>of Washington Mean Noon</b> . . . . .	514
<b>Tables for Conversion of Sidereal to Solar and vice versa, Tables II and III</b> . . . . .	690
<b>Titan, Sixth Satellite of Saturn</b> . . . . .	659, 662, 665, 667



	Page.
<b>Titania, Third Satellite of Uranus</b> . . . . .	668, 669, 670
<b>Transit of the Moon</b> . . . . .	118, 522
<b>Transit of the Planets</b> . . . . .	134, 538
<b>Tropical Year, Length of</b> . . . . .	xviii
<b>Umbriel, Second Satellite of Uranus</b> . . . . .	668, 669, 670
<b>Unit of Distance, Astronomical</b> . . . . .	xviii
<b>Uranus, Distance from Earth, logarithm of</b> . . . . .	193
Elements of Orbit of . . . . .	xix
Greenwich Transit of . . . . .	193
Heliocentric Longitude and Latitude of . . . . .	195
Horizontal Parallax of . . . . .	193, 551
Radius Vector (Distance from Sun), logarithm of . . . . .	195
Reduction to Orbit . . . . .	195
Right Ascension and Declination at Greenwich Mean Noon . . . . .	193
at Washington Transit . . . . .	551
Satellites, Apparent Apssides of . . . . .	668
Diagram of Apparent Orbits of . . . . .	668
Greatest Elongations of . . . . .	668
Sidereal Periods of . . . . .	668
Tables for Determining Position Angle and Distance of . . . . .	669
Semidiameter, Adopted Constant of . . . . .	xix
Apparent . . . . .	193, 551
Sidereal Time of, passing Meridian . . . . .	551
Stellar Magnitude of . . . . .	551
Washington Transit of . . . . .	551
<b>Vega (Alpha Lyreæ), Apparent Place</b> . . . . .	466
Mean Place . . . . .	227
<b>Venus, Apparent Disk of</b> . . . . .	625
Distance from Earth, logarithm of . . . . .	150
Elements of Orbit of . . . . .	xix
Greenwich Transit of . . . . .	150
Heliocentric Longitude and Latitude of . . . . .	158
Horizontal Parallax of . . . . .	150, 542
Occultation of . . . . .	602
Radius Vector (Distance from Sun), logarithm of . . . . .	158
Reduction to Orbit . . . . .	158
Right Ascension and Declination at Greenwich Mean Noon . . . . .	150
at Washington Transit . . . . .	542
Semidiameter, Adopted Constant of . . . . .	xix
Apparent . . . . .	150, 542
Sidereal Time of, passing Meridian . . . . .	542
Stellar Magnitude of . . . . .	625
Washington Transit of . . . . .	542
<b>Washington Ephemeris (Part II)</b> . . . . .	199-554
<b>Year, Length of</b> . . . . .	xviii
<b>Zeta Ursæ Majoris (Mizar), Apparent Place</b> . . . . .	422
Mean Place . . . . .	224
Used for finding time of Culmination of Polaris . . . . .	708
<b>Zodiac, Signs of</b> . . . . .	xx

